THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—28TH YEAR. SYDNEY, SATURDAY, MAY 17, 1941. No. 20.

Table of Contents.

[The Whole of the Literary Matter in THE MEDICAL JOURNAL OF AUSTRALIA is Copyright.]

TOXÆMIC PREGNANCY IN RELATION TO SUBSEQUENT PREGNANCIES, WITH SPECIAL REFERENCE TO RENAL FUNCTION TESTS.

By VERA I. KRIEGER, D.Sc.,

AND

RONALD McK. ROME, M.B., B.S., D.G.O.

(From the Department of Pathology, Women's Hospital, Melbourne.)

IN spite of many investigations little is known of the causes of the toxæmias of pregnancy; but there is no doubt that the kidney plays a very important role in relation to these conditions. Although it is unlikely that this organ is the cause of toxæmias of pregnancy, when damaged it may be an important factor in the course of such conditions. The idea that a renal lesion is the cause of toxæmia has been followed up largely because of the definite signs and symptoms associated with the condition, and because methods for the detection and measurement of renal efficiency have been greatly improved during the last fifteen to twenty years. The literature contains many conflicting statements regarding the toxæmias of pregnancy and the damage inflicted by them on the kidneys. About twenty years ago it was generally accepted that permanent renal damage rarely followed eclampsia or preeclampsia and that there was little likelihood of recurrence, particularly of the former condition. In the so-called nephritic toxæmias it was held that there was invariable recurrence, the toxæmia becoming increasingly severe and occurring earlier in each pregnancy. Harris[1] examined these claims and came to very different conclusions. In his series of preeclamptic patients 60% developed chronic nephritis in subsequent pregnancies—a surprising fact at the time, since it was thought that preeclampsia led to occurrence of eclampsia in later pregnancies. He suggested that preeclamptic patients might be divided into two groups: those likely to contract eclampsia and those contracting chronic nephritis. Although permanent renal damage could not be disregarded after eclampsia, his results indicated that the prognosis in relation to normal subsequent pregnancies was more favourable after eclampsia than after preeclampsia.

In 1924 Young[2] concluded that in the majority of cases of toxæmia of pregnancy renal damage was not the cause of the toxæmia, but the result of the initial disease, which itself was due to the presence of a toxin. In his cases there was no evidence of kidney disease before the toxæmic pregnancy and no evidence of renal or cardiovascular disease between pregnancies, although there might be a recurrence in later pregnancies. In the recurrent toxæmias there was a tendency for premature termination of pregnancy by abortion, stillbirth or accidental hæmorrhage. In his opinion a chronic renal lesion occasionally resulted from one severe toxæmia or might be due to the accumulated effects of several milder toxæmic pregnancies. If toxæmia occurred in two or more pregnancies, he regarded it as necessary to prevent further pregnancies.

Jessie Sym (1929)[3] stated that only a few cases of toxæmia of pregnancy could be proved to be the result of chronic nephritis. Her findings confirmed the statement of Harris, that the prognosis after eclampsia was more favourable than that after severe albuminuria. It was found that the earlier the albumin appeared and the longer it persisted, the greater was the chance of recurrence. Such recurrence might occur in the absence of any detectable trace of renal damage between pregnancies. If recovery occurred after a toxæmic pregnancy, the patient maintained good health unless she again became pregnant.

Toxæmia of pregnancy was found to result in chronic nephritis in 10% of the patients examined by Gibberd.[4] He found that toxæmia recurred in subsequent pregnancies

in 50% of the cases in which renal inefficiency could be proved during, but not after, toxæmic pregnancy. The remaining 40% of the patients had normal subsequent pregnancies. He found it difficult to explain why these patients showed no evidence of renal inefficiency between toxæmic pregnancies. Gibberd disagreed with the idea of an inherent idiosyncrasy suggested by Young, because the initial toxæmic pregnancy frequently occurred after one or even several normal pregnancies. The fact that early induction of labour decreased the possibility of recurrence was a further argument for the effect being acquired rather than inherent.

Browne and Dodds[5] found it difficult to decide whether eclampsia and preeclampsia were likely to result in chronic nephritis unless patients were followed up for two years after the toxæmia. Their figures did not support the contention that eclampsia was less serious in relation to subsequent pregnancies.

These few references illustrate the conflicting observations and conclusions of a few of the workers on this subject. It was therefore thought that the analysis of the records of a large number of toxæmic pregnancies in relation to subsequent pregnancies might help in arriving at more definite conclusions. For this purpose the histories of 652 patients, whose renal efficiency had been determined by chemical tests during an initial toxæmia, and who had had at least one subsequent pregnancy at this hospital during the last ten years, were analysed.

These patients were divided into the following groups: (i) those suffering from albuminuria "A", in which albumin was observed in the urine for one day only; (ii) those suffering from albuminuria "B", in which albumin was observed in the urine for two to four days; (iii) those suffering from albuminuria "C", including those patients who had albuminuria for longer than four days in the ante-partum and post-partum periods and frequently had raised blood pressure and œdema; (iv) those suffering from preeclampsia characterized by raised blood pressure, œdema and albuminuria in conjunction with two or more of the following symptoms: headache, eye signs, blurring of vision, vomiting and epigastric pain; (v) those suffering from chronic nephritis, when there was evidence of permanent renal damage; (vi) those suffering from eclampsia, including only those patients who had had typical eclamptic fits; (vii) those who had accidental hæmorrhage (limited to severe hæmorrhage of the non-traumatic type); (viii) those suffering from pyelitis, including only severe pyelitis in which symptoms had persisted for some time and in which it was suspected that the inflammatory condition had spread into the parenchymatous tissue.

OBSERVATIONS.

Albuminuria "A".

Subsequent Pregnancies.

Among the 29 patients in whose urine albumin was observed for one day only, 19 had a normal subsequent pregnancy and two a severe toxæmia. In later pregnancies there was one instance of recurrent severe toxæmia in two further pregnancies, the pathological condition being classified as chronic nephritis in the third pregnancy after the initial toxæmia (see Table I). In one other case the initial toxæmia was followed by two abortions, and in the third subsequent pregnancy a toxæmia classified as chronic nephritis occurred.

Renal Function Tests.

Because of the short duration of the albuminuria, few renal function tests were made in the ante-partum period of the initial toxæmia. Twenty-one blood urea and 21 urea concentration excretion tests[6] were performed in the puerperium, with the result that only one blood urea

TABLE I.

Showing the Subsequent History of 29 Patients with Albuminuria "A" as the Initial Toxæmia.

		Subsequent Pregnancies.		
	First.	Second.	Third.	Fourth.
29	19 Normal.	13 No subsequent pregnancy. 2 Normal. 2 Abortion. 1 Pyelitis. 1 Hyperemesis.	1 No subsequent pregnancy. 1 Abortion. 1 No subsequent pregnancy. 1 Abortion. 1 Hyperemesis.	1 Abortion.
	6 Abortion.	3 Normal. 3 Abortion.	1 No subsequent pregnancy. 1 Abortion. 1 Chronic nephritis.	
	2 Albuminuria "C". 2 *Post-partum* hæmorrhage.	1 No subsequent pregnancy. 1 Albuminuria "C". 2 No subsequent pregnancy.	1 Chronic nephritis.	

TABLE II.

Results of Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies.		Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
	At Term.	Premature.				
Initial toxæmic pregnancy: Albuminuria "A" (27 patients)	22	1	2	1	—	1
Subsequent pregnancies:						
Normal	20	—	1	—	4	3
Abortions	4	—	—	—	9	—
Toxæmias	3	—	—	—	1	—
Total	27	—	1	—	14	3

TABLE III.
Showing the Subsequent History of 59 Patients with Albuminuria "B" as the Initial Toxæmia.

First.	Subsequent Pregnancies. Second.	Third.	Fourth.	Fifth.
29 Normal.	23 No subsequent pregnancy. 2 Normal. 3 Abortion. 1 Albuminuria "A".	2 No subsequent pregnancy. 1 Abortion. 1 Normal.	1 Normal. 1 Normal.	1 Normal.
12 Abortion.	7 No subsequent pregnancy. 5 Abortion.	2 No subsequent pregnancy. 1 Abortion. 2 Normal.	1 No subsequent pregnancy. 1 Normal.	
18 Toxæmia: 7 Albuminuria "A" or "B".	3 No subsequent pregnancy. 4 Albuminuria "B".	4 Abortion.	2 No subsequent pregnancy. 2 Normal.	1 No subsequent pregnancy. 1 Normal.
18 Toxæmia: 11 Albuminuria "C".	8 No subsequent pregnancy. 1 Abortion. 2 Chronic nephritis.			

test and four urea concentration-excretion tests indicated kidney dysfunction. Renal inefficiency was proved by these tests in the two cases in which a subsequent severe toxæmia of pregnancy occurred.

Births.

In Table II the incidence of living children and stillbirths in the initial toxæmic pregnancy and in subsequent pregnancies is tabulated. The low incidence of premature babies and stillbirths is to be noted, both in the initial toxæmic pregnancy and in subsequent pregnancies.

Albuminuria "B".

Subsequent Pregnancies.

Of the 59 patients suffering from albuminuria persisting for two to four days, 50% had a normal pregnancy following the toxæmic pregnancy, whilst in one-third of these cases a second toxæmic pregnancy occurred (see Table III). Mild toxæmia occurred in seven cases and severe toxæmia in eleven. In the remote pregnancies no severe toxæmia occurred after an intermediate pregnancy which was either normal or mildly toxæmic, or in which abortion occurred. Two of the eleven patients who suffered from severe toxæmia in the pregnancy following the initial toxæmic one, were classified in the second subsequent pregnancy as suffering from chronic nephritis.

Renal Function Tests.

The blood urea content of 24 patients was determined in the ante-partum period, and it was high in only three instances. Each of these patients had a toxæmia in the subsequent pregnancy. Renal inefficiency was detected by the urea concentration-excretion test in 12 of the 24 patients tested. Twelve patients suffered from toxæmia in the subsequent pregnancy. Tests were made on 48 patients in the puerperium. Only one blood urea test gave an abnormal result; but seven urea concentration-excretion tests gave poor results. The decrease in the number of poor results to renal function tests in the puerperium already observed in the patients in the "Albuminuria 'A'" group occurs in this group also. Very few renal function tests were made in subsequent non-toxæmic pregnancies. No abnormal results to blood urea tests were recorded with respect to patients having a second toxæmic pregnancy who were in the ante-partum period, and only one such result was recorded in the puerperium. This patient was not tested before delivery, but had had a high blood urea level in the initial toxæmic pregnancy. Four of the 14 urea concentration-excretion tests made before delivery and six out of 11 tests in the puerperium indicated renal damage. This pronounced increase in the number of patients with poor renal function in the puerperium, when a toxæmic pregnancy occurs after an initial mild toxæmia, is worthy of note.

Births.

From Table IV it will be seen that there were approximately 10% of stillbirths in this group of patients, not only in the initial toxæmia, but also in subsequent pregnancies, as well as a similar percentage of premature births in the initial pregnancy.

TABLE IV.
Results of Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies. At Term.	Living Babies. Premature.	Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
Initial toxæmic pregnancy: Albuminuria "B" (59 patients)	44	5 and 1 died	5	1	—	3
Subsequent pregnancies:						
Normal	30	—	2	—	4	—
Abortions	5	—	—	—	14	—
Toxæmias	19	2 and 1 died	2	2	7	—
Total	54	2 and 1 died	4	2	25	—

Albuminuria "C".

Subsequent Pregnancies.

Ninety-one of the 246 patients classified in the group "Albuminuria 'C'" (Table V) had a normal subsequent pregnancy, 45 aborted, and 110 suffered a second toxæmia. Six *per centum* of the patients suffered a severe toxæmia after an intermediate normal pregnancy or an abortion, and 8·5% had another severe toxæmia following two consecutive toxæmic pregnancies. Thus 44% of the patients with an initial persistent albuminuria had toxæmia in the immediately following pregnancy, and 14·5% had a severe toxæmia in the second or still more remote pregnancy;

TABLE V.

Showing Subsequent History of 246 Patients with Albuminuria "C" as the Initial Toxæmia.

	Subsequent Pregnancies.					
First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.
91 Normal.	53 No subsequent pregnancy.					
	19 Normal.	15 No subsequent pregnancy.				
		4 Normal.	1 No subsequent pregnancy. 1 Normal. 2 Albuminuria "C".			
	13 Abortion	8 No subsequent pregnancy.				
		5 Abortion.	1 Pyelitis. 1 Chronic nephritis. 2 Normal. 1 Abortion.			
	3 Albuminuria "A".					
	1 Albuminuria "C".					
	1 *Post-partum* hæmorrhage.					
	1 Chronic nephritis.					
45 Abortion.	18 No subsequent pregnancy.					
	7 Normal.	4 No subsequent pregnancy. 2 Normal. 1 Abortion. 3 No subsequent pregnancy.	1 Normal.			
	7 Abortion.	1 Normal.	1 Abortion.	1 Preeclampsia.		
	4 Albuminuria "C".					
	4 Preeclampsia.					
	1 Chronic nephritis.					
	1 Pyelitis.					
	2 Abortion.	2 Abortion.	1 Abortion. 1 Albuminuria "C".	1 Abortion.	1 Abortion.	1 Preeclampsia.
	1 Normal.	1 Normal.	1 Abortion.	1 Severe accidental hæmorrhage.		
110 Toxæmia.						
10 Albuminuria "A".	3 No subsequent pregnancy.					
	7 Albuminuria "A".					
7 Albuminuria "B".	6 No subsequent pregnancy.					
	1 Premature baby.	1 Abortion.	1 Abortion.	1 Albuminuria "B".		
61 Albuminuria "C".	33 No subsequent pregnancy.					
	3 Normal.					
	1 Albuminuria "A".					
	5 Abortion.	4 No subsequent pregnancy.				
		1 Preeclampsia.				
		5 No subsequent pregnancy.				
	8 Albuminuria "C".	2 Abortion.	1 No subsequent pregnancy. 1 Preeclampsia.			
		1 Albuminuria "C".				
	4 Preeclampsia.	3 No subsequent pregnancy.				
		1 Chronic nephritis.				
	5 Chronic nephritis.	No subsequent pregnancy.				
	1 Premature baby.	1 Chronic nephritis.				
	1 Accidental hæmorrhage.					
5 Chronic nephritis.	5 No subsequent pregnancy.					
15 Preeclampsia.	14 No subsequent pregnancy.					
	1 Preeclampsia.	1 Preeclampsia.	1 Chronic nephritis.			
9 Accidental hæmorrhage.	7 No subsequent pregnancy.					
	1 Chronic nephritis.					
	1 Accidental hæmorrhage.					
1 Eclampsia.	1 Abortion.	1 Preeclampsia.				
1 Pyelitis.						
1 *Post-partum* hæmorrhage.						

in some cases this occurred after a normal intermediate pregnancy. Twelve patients were finally classified as suffering from chronic nephritis. In the toxæmic pregnancies following the initial toxæmia of this type there were nine cases of accidental hæmorrhage and only one case of eclampsia.

Renal Function Tests.

The group "Albuminuria 'C'" has been defined as comprising those patients who had albumin in the urine for longer than four days in the ante-partum and post-partum periods. To determine the effect of the length of time during which albuminuria persisted before delivery, the group was subdivided into four groups: (i) albumin persisting for four days, (ii) albumin persisting from four to eight days, (iii) albumin persisting from nine to fourteen days, (iv) albumin persisting for fifteen days or more.

The number of patients in each of these groups was tabulated in relation to the type of the subsequent pregnancy (Table VI).

TABLE VI.

Correlation of the Type of Subsequent Pregnancy after an Initial Toxæmia of the Type Albuminuria "C" with the Persistence of Albuminuria.

Albuminuria.				Total Patients.	Type of Subsequent Pregnancy.
Four Days' Duration.	Four to Eight Days' Duration.	Nine to Fourteen Days' Duration.	Fifteen Days and Over.		
41	14	17	8	80	Normal.
17	3	8	3	31	Abortion.
11	15	13	21	60	Toxæmia.
69	32	38	32	171	

From this table it appears that when albuminuria persists for so short a time as four to eight days there is a grave risk of toxæmia in a subsequent pregnancy (this occurred in 15 cases out of 32). It also shows that of the 60 patients who had toxæmia in the subsequent pregnancy, only 11 had albuminuria of less than four days' duration in the initial toxæmia. This verifies the conclusions already drawn in the groups "Albuminuria 'A'" and "Albuminuria 'B'", that the mild toxæmias are seldom followed by toxæmia in the subsequent pregnancy. If, however, the albuminuria persists for longer than four days in the initial toxæmia, the subsequent pregnancy is likely to be toxæmic in about 50% of cases.

Blood urea tests were made in the ante-partum period on 88 patients with persistent albuminuria. Severe renal damage was demonstrated in only three patients, whose blood urea level was higher than 40 milligrammes *per centum*, and milder damage was found in 13 patients whose blood urea level varied from 30 to 40 milligrammes *per centum*. Tests were repeated on ten patients because of persistence of albuminuria, and some damage was still present in five of them in spite of treatment. One hundred and ten patients were tested in the puerperium and abnormal values were obtained in eight.

The urea concentration-excretion test indicated renal inefficiency in 64 (71%) of the 110 patients tested in the ante-partum period, and the result was confirmed in 17 of 21 patients who were retested before delivery. A pronounced improvement in renal function occurred in the puerperium, since only 33 (27%) of 121 patients tested had poor urea concentration-excretion values eight days *post partum*. In a group of 33 of the patients in whom severe toxæmia followed the initial albuminuria "C", 70% of tests in the ante-partum period and 48% in the puerperium indicated renal inefficiency in the initial toxæmia. A comparison of these results with those obtained for the total group emphasizes the fact that patients in whom renal inefficiency has been demonstrated in the ante-partum and post-partum periods in a pregnancy complicated by persistent albuminuria, are likely to contract toxæmia in a subsequent pregnancy. A number of these patients were found in subsequent pregnancies to have renal inefficiency. When such a pregnancy was normal, three of the fourteen patients tested before delivery and two of the four in the puerperium had renal dysfunction. Thirty-nine of 81 patients (48%) had renal damage before delivery, and 27 of the 86 (31%) had renal damage in the puerperium in the subsequent toxæmic pregnancy. The improvement of renal efficiency noted during the puerperium in so many patients in the initial toxæmia is not nearly so evident in tests made in the puerperium of subsequent toxæmic pregnancies. However, the ratio of the number of patients with renal involvement in the puerperium to those with renal involvement before delivery is very similar to that observed in the initial toxæmias, when only those patients whose subsequent pregnancy was toxæmic are considered. One concludes, therefore, that patients with both persistent albuminuria and renal inefficiency in both the ante-partum and post-partum periods are likely to develop toxæmia in subsequent pregnancies. Furthermore, renal inefficiency is likely to be present again in both the ante-partum and post-partum periods of the subsequent toxæmic pregnancy.

Births.

There were 175 living babies from the pregnancies in this group, of whom 45 were premature and six died within a few hours of birth; there were 44 stillbirths (16%). In subsequent pregnancies 259 babies were born alive, and these included 16 who died soon after birth and 39 premature babies. In addition, 37 babies (9%) were stillborn. The majority of the premature births and stillbirths occurred in toxæmic pregnancies following the original toxæmic pregnancy.

Preeclampsia.

Subsequent Pregnancies.

Seventy-four patients were classified in the preeclamptic group (see Table VIII). There were 26 normal pregnancies, 10 mildly toxæmic pregnancies, and 27 severely

TABLE VII.

Results of Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies.		Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
	At Term.	Premature.				
Initial toxæmic pregnancy: Albuminuria "C" (246 patients)	127 and 3 died	42 and 3 died	43	1	4	23
Subsequent pregnancies:						
Normal	109 and 2 died	1	1	—	10	—
Abortions	16	2 and 1 died	1	—	53	—
Toxæmias	87 and 3 died	31 and 8 died	27	8	26	23
Total	212 and 8 died	31 and 8 died	29	8	89	23

TABLE VIII.

Showing Subsequent History of 74 Patients with Preeclampsia as the Initial Toxæmia.

	Subsequent Pregnancies.			
First.	Second.	Third.	Fourth.	Fifth.
26 Normal.	17 No subsequent pregnancy. 6 Normal. 3 Abortion.	2 No subsequent pregnancy. 4 Normal. 1 No subsequent pregnancy. 2 Normal.	3 No subsequent pregnancy. 1 Abortion. 1 No subsequent pregnancy. 1 Normal.	1 Normal. 1 *Placenta prævia*.
11 Abortion.	4 No subsequent pregnancy. 2 Normal. 5 Abortion.	1 No subsequent pregnancy. 1 Albuminuria "A". 1 No subsequent pregnancy. 3 Abortion. 1 Hypertension.	1 *Post-partum* hæmorrhage. 2 Abortion. 1 Normal.	1 No subsequent pregnancy. 1 Abortion.
Mild toxæmia. 4 Albuminuria "A".	4 No subsequent pregnancy.			
Mild toxæmia. 6 Albuminuria "B".	3 No subsequent pregnancy. 2 Normal. 1 Chronic nephritis.	1 No subsequent pregnancy. 1 Abortion.	1 Normal.	
Severe toxæmia. 10 Albuminuria "C".	6 No subsequent pregnancy. 1 Abortion. 1 Albuminuria "C". 1 Chronic nephritis. 1 Accidental hæmorrhage.	1 Albuminuria "B". 1 Chronic nephritis. 1 Abortion.	1 Normal.	
Severe toxæmia. 11 Preeclampsia.	7 No subsequent pregnancy. 1 Normal. 1 Premature baby. 1 Preeclampsia. 1 Chronic nephritis.	1 Abortion.	1 Abortion.	1 Normal.
Severe toxæmia. 5 Chronic nephritis.	3 No subsequent pregnancy.			
Severe toxæmia. 1 Pyelitis.	2 Chronic nephritis. 1 No subsequent pregnancy.	1 No subsequent pregnancy. 1 Chronic nephritis.		

toxæmic pregnancies, as well as 11 abortions in the pregnancy following the preeclamptic toxæmia. When preeclampsia was followed by a normal pregnancy there were no toxæmias in still later pregnancies. Among those patients whose subsequent pregnancy ended in abortion, only one case of mild toxæmia occurred in the later pregnancies. One patient was classified as having chronic nephritis in a pregnancy following an initial pregnancy characterized by preeclampsia and a subsequent mild toxæmia. Among patients who had suffered from preeclampsia and one subsequent severe toxæmia there were 18 later pregnancies. Nine of these pregnancies were classified as severely toxæmic, one patient had a mild toxæmia, and four women aborted. It is interesting that whilst no case of eclampsia occurred subsequent to an initial preeclamptic toxæmia in this group of 74 patients, eight patients were finally classified as having chronic nephritis.

Renal Function Tests.

Blood urea tests were performed on 38 patients before delivery in the initial toxæmic pregnancy. In seven instances the blood urea content was over 40 milligrammes per 100 cubic centimetres, and in another six the values ranged from 30 to 40 milligrammes per 100 cubic centimetres. In the puerperium there was only one patient out of 40 with a high blood urea level, and she suffered from a severe toxæmia in her next pregnancy. In comparison with the patients classified in the group "Albuminuria 'C'", slight increases in blood urea content were about twice as common and pronounced increases about five times as numerous in the ante-partum period among the preeclamptic patients. Renal inefficiency was indicated by poor results to renal function tests in 31 out of 37 (84%) patients tested before delivery, and in 22 of the 49 (45%) of those tested after delivery. In comparison with "Albuminuria 'C'" it is interesting to note that over 10% more patients suffered from renal inefficiency in the ante-partum period, and that this persisted in nearly 20% more preeclamptic patients in the puerperium. Very few renal function tests were made in subsequent pregnancies which were normal or mildly toxæmic or which ended in abortion. In those cases in which severe toxæmia followed preeclampsia, the urea concentration-excretion test indicated poor renal function in 16 of 24 patients (67%) tested before delivery, and in eight of the 20 patients (40%) examined *post partum* in the second toxæmic pregnancy. These results lead to the conclusion that preeclampsia inflicts greater renal damage than albuminuria "C".

Births.

The initial pregnancies in this group resulted in the birth of 60 living babies, of whom 28 were premature; six of these died within a few days. Ten of the babies were stillborn. In the subsequent pregnancies, 84 living babies were born, but 21 were premature and two of these soon died. There were four stillbirths (see Table IX).

Eclampsia.

Subsequent Pregnancies.

It is of interest to record that 355 eclamptic patients were treated during the ten years from 1930 to 1939, and that 51 of these patients died. Since this investigation is concerned only with those patients whose renal function had been tested and who had had at least one subsequent pregnancy, the histories of only 106 of them were suitable for an analysis. Normal pregnancy followed eclampsia in 43 cases, and of the 13 patients who had still further pregnancies, three contracted toxæmia in the second subsequent pregnancy. One of these three patients had a recurrence of toxæmia in a fourth pregnancy. In the third subsequent pregnancy four other patients developed a severe toxæmia, and two of these had a fourth subsequent pregnancy complicated by severe toxæmia. One of the 13 patients had three normal preg-

TABLE IX.

Results of the Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies.		Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
	At Term.	Premature.				
Initial toxæmic pregnancy: Preeclampsia (74 patients)	32	22 and 6 died	6	4	—	4
Subsequent pregnancies:						
Normal	32	—	3	—	5	1
Abortions	4	1	—	—	16	—
Toxæmias	27	18 and 2 died	1	—	12	—
Total	63	19 and 2 died	4	—	33	1

nancies after eclampsia and again developed eclampsia in the fourth subsequent pregnancy. Fourteen patients aborted in a pregnancy subsequent to an eclamptic pregnancy. One of these patients developed eclampsia in the second subsequent pregnancy, and four had a further severe toxæmia in the third, fourth or fifth subsequent pregnancy. In one of these cases eclampsia was followed by four abortions and the fifth subsequent pregnancy was preeclamptic. When the incidence of toxæmia in pregnancies subsequent to an initial toxæmia followed by either a normal pregnancy or an abortion is considered, the large number of subsequent toxæmias is very striking in the eclamptic group. There were 19 severe toxæmias in 136 remote pregnancies in the group "Albuminuria 'C'", one in 37 in the preeclamptic group, and 17 in 57 in the eclamptic group.

TABLE X.

Showing Subsequent History of 106 Patients with Eclampsia as the Initial Toxæmia.

Subsequent Pregnancies.

		First.	Second.	Third.	Fourth.	Fifth.
Subsequent history of 355 patients with eclampsia during period of 10 years.	55 Died.	43 Normal.	30 No subsequent pregnancy. 9 Normal. 1 Abortion. 1 Pyelitis. 2 Albuminuria "C".	4 No subsequent pregnancy. 1 Normal. 1 Abortion. 2 Albuminuria "C". 1 Eclampsia. 1 Preeclampsia. 1 Abortion. 1 Abortion. 1 Preeclampsia.	1 Eclampsia. 1 No subsequent pregnancy. 1 Preeclampsia. 1 Eclampsia.	
	106 subsequent pregnancy + renal investigation.	14 Abortion.	4 No subsequent pregnancy. 6 Abortion. 2 Normal. 1 Albuminuria "A". 1 Eclampsia.	3 No subsequent pregnancy. 1 Abortion. 1 Preeclampsia. 1 Eclampsia. 1 No subsequent pregnancy. 1 Accidental hæmorrhage. 1 Abortion.	1 Abortion. 1 Chronic nephritis. 1 Normal. 1 Chronic nephritis.	1 Preeclampsia.
	194 No subsequent investigation.	Mild toxæmia: 5 Albuminuria "A". Mild toxæmia: 1 Albuminuria "B".	3 No subsequent pregnancy. 2 Normal.	1 No subsequent pregnancy. 1 Normal.		
		Mild toxæmia: 2 Pyelitis.	1 No subsequent pregnancy.			
		Mild toxæmia: 2 Post-partum hæmorrhage.	1 No subsequent pregnancy. 1 Pyelitis.			
			1 No subsequent pregnancy. 1 Post-partum hæmorrhage.			
		Severe toxæmias: 15 Albuminuria "C".	10 No subsequent pregnancy. 1 Normal. 2 Albuminuria "C". 1 Preeclampsia. 1 Chronic nephritis.	1 No subsequent pregnancy. 1 Eclampsia.		
		Severe toxæmias: 9 Preeclampsia.	8 No subsequent pregnancy. 1 Albuminuria "C".			
		Severe toxæmias: 3 Chronic nephritis.	3 No subsequent pregnancy.			
		Severe toxæmias: 12 Eclampsia.	10 No subsequent pregnancy. 1 Normal. 1 Albuminuria "C".	1 Abortion.	1 Albuminuria "A".	

Six patients had a mild toxæmia and 39 a severe toxæmia following an initial eclampsia. Only 12 of these 44 patients had a second subsequent pregnancy, and toxæmia developed in seven of these pregnancies. Of the three patients who had a third subsequent pregnancy, one had a normal pregnancy and two a further toxæmic pregnancy. In one of these patients this toxæmia was again of the eclamptic type. Inspection of Table X shows the high incidence of toxæmias in pregnancies following an initial eclamptic attack. The most striking feature is the high incidence of severe toxæmia in the remote pregnancies, even when a normal pregnancy or an abortion has followed an initial eclamptic attack.

Renal Function Tests.

Many eclamptic patients were too ill to have renal function tests performed before delivery. Nine of 18 tests made gave abnormal results indicating severe renal damage, and seven of the 11 urea concentration-excretion tests also revealed renal inefficiency. Nine of the 28 blood urea tests and 20 of the 59 urea concentration-excretion tests made in the puerperium still gave abnormal results. In this group the number of blood urea tests before delivery that gave abnormal results is much greater than in any of the other toxæmias, and the persistence of such results in the puerperium shows the severe damage inflicted on the kidneys by this condition. In subsequent pregnancies 12 of the 58 blood urea tests before delivery and seven of the 47 tests made *post partum* produced abnormal results. Seventeen of 55 urea concentration-excretion tests before delivery and 14 of the 50 tests made *post partum* indicated renal inefficiency. The large number of abnormal results to blood urea tests in these subsequent pregnancies is again characteristic of the eclamptic group, and is probably due to the fact that many of the subsequent toxæmias were of the preeclamptic, eclamptic or chronic nephritic type.

Births.

Of the 70 living babies, 18 were premature and five died shortly after birth. There were 29 stillbirths. In subsequent pregnancies there were 138 living children, including 16 premature babies and four who died within a few hours of birth; in addition there were 14 stillbirths and 44 abortions (Table XI). The number of stillbirths shows a great increase over those in the toxæmias already studied.

Accidental Hæmorrhage.

Subsequent Pregnancies.

Of 25 patients whose initial pregnancy was complicated by accidental hæmorrhage, six had a subsequent normal pregnancy, two had mild toxæmias and 17 had severe toxæmias. Only five of these patients had a second subsequent pregnancy. The high incidence of toxæmic pregnancies following severe accidental hæmorrhage is very striking, as is also the fact that the number of second subsequent pregnancies was limited to five.

TABLE XII.

Showing Subsequent History of 25 Patients with Accidental Hæmorrhage as the Initial Manifestation of Toxæmia.

	Subsequent Pregnancies.	
	First.	Second.
	6 Normal.	4 No subsequent pregnancy. 2 Normal.
2 Mild toxæmia.	1 Hypertension.	
	1 Albuminuria "A".	1 No subsequent pregnancy.
	1 Albuminuria "B".	1 No subsequent pregnancy.
16 Severe toxæmia.	7 Albuminuria "C".	6 No subsequent pregnancy. 1 Normal.
	2 Preeclampsia.	1 No subsequent pregnancy. 1 Preeclampsia.
	1 Eclampsia.	
	1 Chronic nephritis.	
	Accidental hæmorrhage.	4 No subsequent pregnancy. 1 Chronic nephritis.

Renal Function Tests.

Very few renal function tests were made in the antepartum period of either the initial toxæmic pregnancy or subsequent pregnancies. Blood urea values were high and the results of urea concentration-excretion tests were low in five of the 16 tests performed eight days after delivery in the initial toxæmic pregnancy. Six of the 13 patients showed renal inefficiency in the puerperium in subsequent pregnancies. The proportion of patients with renal inefficiency in the puerperium in subsequent pregnancies is higher in this group than in the other toxæmic pregnancies investigated.

Births.

In the initial pregnancy in this group there were only six living babies, three of whom were premature; sixteen were stillborn. The other three patients aborted. This is by far the highest incidence of stillbirths recorded in the series, and leads to the question of the part played by toxæmia in producing this result.

Pyelitis.

Subsequent Pregnancies.

Since normal pregnancy usually follows pregnancy complicated by mild pyelitis, only severe and persistent cases of pyelitis in which kidney function might be involved have been studied (Table XIII). Twenty-two of the 48 patients had a normal subsequent pregnancy, eight aborted and 18 had a further toxæmic pregnancy. The occurrence of pyelitis for the second time in 11 of these cases suggests that the original infection had never completely disappeared, or that the same factors, whether physiological or mechanical, resulted in a second attack. It will be seen from Table XIII that the incidence of severe toxæmias following pyelitis is small. In only one instance was a patient finally classified as having chronic nephritis. There was one instance of accidental hæmorrhage and another of eclampsia.

TABLE XI.

Results of the Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies.		Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
	At Term.	Premature.				
Initial toxæmic pregnancy: Eclampsia (106 patients)	48 and 4 died.	17 and 1 died.	26	1	2	7
Subsequent pregnancies:						
Normal	63 and 2 died.	2	3	1	8	—
Abortions	7	2	3	—	18	—
Toxæmias	50	10 and 2 died.	6	1	18	—
Total	120 and 2 died.	14 and 2 died.	12	2	44	—

TABLE XIII.

Showing Subsequent History of 48 Patients with Severe Pyelitis as the Initial Toxæmia.

	Subsequent Pregnancies.			
First.	Second.	Third.	Fourth.	Fifth.
22 Normal.	19 No subsequent pregnancy. 1 Normal. 2 Abortion.	1 No subsequent pregnancy. 1 Abortion.	1 Abortion.	
8 Abortion.	4 No subsequent pregnancy. 1 Normal. 2 Abortion. 1 Pyelitis.	1 Abortion. 1 Pyelitis.	1 Abortion. 1 Normal.	1 Normal.
18 toxæmia. 1 Stillbirth. 2 Albuminuria "A". 2 Albuminuria "C". 11 Pyelitis. 1 Accidental hæmorrhage. 1 Hyperemesis.	1 Eclampsia. 1 No subsequent pregnancy. 1 Abortion. 1 No subsequent pregnancy. 1 Albuminuria "C". 7 No subsequent pregnancy. 1 Normal. 3 Pyelitis.	1 Normal. 1 Pyelitis. 1 Chronic nephritis and pyelitis. 1 No subsequent pregnancy.	1 Normal. 1 Pyelitis.	1 Abortion.

Renal Function Tests.

Gross renal damage was indicated by high results to two blood urea tests in a total of 25, and renal inefficiency was present in 17 of the 26 patients who had urea concentration-excretion tests before delivery. Renal function was normal in the puerperium in 12 of the 16 patients investigated. In subsequent pregnancies very few renal function tests were made. Seven out of 15 urea concentration-excretion tests gave low results before delivery, and three out of twelve gave low results in the puerperium. These results show that severe pyelitis causes a decrease in renal efficiency during pregnancy in about two-thirds of the patients, but that there is a pronounced improvement after delivery. In subsequent pregnancies many of these patients again had renal damage, which cleared up in the puerperium in the majority of cases.

Births.

Twenty-nine living babies, of whom eight were premature, and seven stillbirths (16%) were recorded for this group. In subsequent pregnancies the 49 births included 41 normal babies born at term, six premature babies and two stillborn babies (Table XIV).

Chronic Nephritis.

Subsequent Pregnancies.

In the "chronic nephritis" group there are 66 patients, including all the cases occurring during the period of the investigation, regardless of whether the diagnosis of chronic nephritis was made in the initial toxæmia (11 cases) or in later pregnancies (55 cases). Six patients were diagnosed as having chronic nephritis in their first pregnancy. In five cases there were one or more normal pregnancies or abortions before the patient was classified as having chronic nephritis. In four instances this condition developed after the mild toxæmia albuminuria "A" or "B"; but 50 patients who had severe toxæmias were finally placed in this group. There were relatively few subsequent pregnancies following the diagnosis of chronic nephritis (14 pregnancies among the 66 patients studied). (See Table XV.)

Renal Function Tests.

Gross renal damage, as revealed by the abnormal results obtained in over 25% of the 56 blood urea tests made in the ante-partum period, was more prevalent than in any group with the exception of the eclamptic group. Twelve of 43 patients tested after delivery had blood urea values above 40 milligrammes per 100 cubic centimetres; this indicated the persistence of gross renal damage after delivery. These results were again comparable with those found in eclampsia. In six tests out of 17 made in the puerperium the results were abnormal. This persistence of severe renal damage is in pronounced contrast to the results of such tests in all other groups. Even in the eclamptic group abnormal results were obtained to only seven blood urea tests in a total of 47 tests made in the puerperium of subsequent pregnancies.

TABLE XIV.

Results of the Initial Toxæmic Pregnancy and Subsequent Pregnancies.

Pregnancy.	Living Babies.		Stillbirths.	Macerated Babies.	Abortions.	Unclassified.
	At Term.	Premature.				
Initial toxæmic pregnancy: Pyelitis (48 patients) ..	21	7 and 1 died.	6	1	1	11
Subsequent pregnancies:						
Normal	17	4	1	—	4	—
Abortions	3	—	—	—	14	—
Toxæmias	5	1	—	—	3	—
Recurrent pyelitis	16	1	—	—	5	—
Totals	41	6	1	—	26	—

TABLE XV.

Showing the Pregnancies Before the Onset of Chronic Nephritis and Those Subsequent to it in 66 Cases.

First Toxæmia.	First.	Subsequent Pregnancies. Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.
5 Previous pregnancies. Normal or abortion.	5 Chronic nephritis.	5 No subsequent pregnancy.					
2 Albuminuria "A".	1 Chronic nephritis.						
	1 Preeclampsia.	1 Chronic nephritis.	1 Chronic nephritis.				
2 Albuminuria "B".	1 Chronic nephritis.						
	1 Normal.	1 Abortion.	1 Chronic nephritis.				
	16 Chronic nephritis.						
		1 Chronic nephritis.	1 Chronic nephritis.				
		1 Abortion.	1 Chronic nephritis.				
	5 Normal.	1 Premature baby.					
		2 Normal.	1 Abortion.	1 Chronic nephritis.			
			1 Normal.	1 Normal.	1 Normal.	1 Chronic nephritis.	
31 Albuminuria "C".	3 Abortion.						1 Chronic nephritis
		2 Chronic nephritis.					1 Chronic nephritis.[1]
		1 Normal.	1 Normal.	1 Abortion.	1 Chronic nephritis.		
	1 Albuminuria "B".	1 Chronic nephritis.					
	5 Albuminuria "C".	3 Chronic nephritis.	1 Chronic nephritis.				
		1 Chronic nephritis.	1 Chronic nephritis.				
	1 Preeclampsia.	1 Albuminuria "C".	1 Chronic nephritis.	1 Chronic nephritis.			
		1 Unclassified.					
	5 Chronic nephritis.						
	1 Albuminuria "B".	1 Chronic nephritis.					
9 Preeclampsia.	1 Chronic nephritis.						
	2 Preeclampsia.	1 Abortion.	1 Chronic nephritis.	1 Chronic nephritis.			
	1 Albuminuria "C".	1 Chronic nephritis.	1 Chronic nephritis.				
		2 No subsequent pregnancy.					
	3 Chronic nephritis.	1 Chronic nephritis.					
	1 Preeclampsia.	1 Preeclampsia.					
8 Eclampsia.		1 Albuminuria "C".					
	2 Normal.	1 *Post-partum* haemorrhage.	1 Chronic nephritis.	1 Normal.	1 Normal.	1 Preeclampsia.	1 Chronic nephritis.
		1 Normal.	1 Unclassified.	1 Chronic nephritis.			
	2 Abortion.	1 Abortion.	1 Abortion.	1 Chronic nephritis.			
		1 No subsequent pregnancy.	1 Chronic nephritis.				
6 Chronic nephritis.	4 Chronic nephritis.		2 No subsequent pregnancy.				
		3 Chronic nephritis.	1 Chronic nephritis.				
	1 Accidental hæmorrhage.	1 Abortion.					
1 Accidental hæmorrhage.	1[2]						
1 Pyelitis.	1 Chronic nephritis.						
	1 Pyelitis.	1 Pyelitis.	1 Pyelitis and chronic nephritis.				
1 Hypertension.	1 Abortion.	1 Abortion.	1 Hypertension.				

[1] Eighth pregnancy. [2] Nothing known of intermediate pregnancies; chronic nephritis in fourteenth pregnancy.

The urea concentration-excretion tests yielded further interesting information. About 70% of the 54 tests made before delivery in the initial toxæmia revealed renal inefficiency. Forty-three patients were tested after delivery and 70% of these still had kidney damage. This persistence of renal damage after delivery in the majority of cases is in striking contrast to the observations in each of the other groups, in which poor results to tests made before delivery were followed in most instances by normal results to tests made in the puerperium. In subsequent pregnancies three-fifths of the 19 patients tested had renal inefficiency before delivery, and 12 of the 17 investigated in the puerperium still had renal damage. The renal function tests are of considerable importance in revealing the persistence of renal damage characteristic of patients with chronic nephritis.

Births.

Only 26 of the 66 patients had living babies. Fourteen of these were premature, and seven of these died within a few hours. Twenty babies were stillborn. Abortion, frequently caused by medicinal means early in pregnancy, occurred in the remaining 20 cases. There were only 14 pregnancies subsequent to those in which chronic nephritis was diagnosed. No babies were delivered at term; but there were seven premature births with living babies, six stillbirths and one abortion.

DISCUSSION.

Incidence of Initial Toxæmia in Relation to Parity and Age of Patient.

When the relationship of parity and age of the patient to the initial toxæmia is under consideration, chronic nephritis cannot be included, since the majority of such

TABLE XVI.

A Comparison of Parity and Age of Patients with the Manifestation of the Initial Toxæmia.

Manifestation of Toxæmia.	Percentage of Cases.								
	Age Groups.				Parity.				
	Up to 25 Years.	26 to 30 Years.	31 to 35 Years.	36 and Over.	1	2	3	4	5
Albuminuria "A"	64	24	8	4	56	12	16	4	12
Albuminuria "B"	51	23	6	20	49	16	12	3	20
Albuminuria "C"	64	20	9	7	73	6	1	9	11
Preeclampsia	63	15	12	10	64	11	8	2	15
Eclampsia	65	26	6	3	81	7	3	5	4
Accidental hæmorrhage	54	29	9	8	54	17	4	4	21
Pyelitis	66	22	6	6	62	10	10	6	12
Chronic nephritis	6	17	33	44	4·5	7·5	20	8	60

patients were classified in this group only after toxæmic pregnancies had previously occurred. Inspection of Table XVI shows that the initial toxæmic pregnancy occurred chiefly in patients aged under thirty years. This is to be expected, since the initial toxæmia occurred in the first pregnancy of about 63% of the patients.

Relation between the Initial Toxæmia and the Number of Subsequent Pregnancies.

From the information available there is no record of the total number of patients who had a toxæmic pregnancy and no subsequent pregnancies. Among the patients who had a subsequent pregnancy, 60% had no further pregnancy even when the second pregnancy was normal or ended in abortion. This limitation of pregnancies in patients still young is certainly remarkable.

TABLE XVII.

Correlation of Type of Initial Manifestation of Toxæmic Pregnancy and the Number of Subsequent Pregnancies.

Number of Patients.	Manifestation of Toxæmia.	Number of Subsequent Pregnancies.			
		2	3	4	5 or More.
88	Albuminuria "A" and "B"	57	16	9	6
246	Albuminuria "C"	141	80	9	16
74	Preeclampsia	45	13	7	9
106	Eclampsia	71	18	10	7
25	Accidental hæmorrhage	20	5	—	—

To decide whether a special type of toxæmia had a greater effect than others on the number of subsequent pregnancies, the main types are tabulated in relation to the number of subsequent pregnancies (see Table XVII).

The results for each of the severe toxæmias were compared with those in the mild toxæmias "A" and "B", and no significant relationship could be proved between any type of toxæmic pregnancy and the number of pregnancies likely to follow it. There was some evidence suggesting that few patients would be likely to have more than two subsequent pregnancies after a pregnancy complicated by accidental hæmorrhage; but the number of patients investigated was too small for a satisfactory statistical analysis.

Initial Toxæmia in Relation to whether the Subsequent Pregnancy is likely to be Normal or Toxæmic.

General.

In Table XVIII the incidence of normal and toxæmic pregnancy immediately following an initial toxæmic pregnancy is set out. The severely toxæmic pregnancies (albuminuria "C", preeclampsia and eclampsia) are followed by fewer normal pregnancies and by more severe toxæmias in these subsequent pregnancies than are found after the mild toxæmias (albuminuria "A" and "B"). The incidence of severe toxæmia is particularly striking following severe accidental hæmorrhage. After one attack of severe pyelitis 23% of the patients had pyelitis as a complicating factor in the subsequent pregnancy.

Albuminuria "C", Preeclampsia and Eclampsia in Relation to Subsequent Normal or Toxæmic Pregnancies.

From Tables I and III it has already been shown that pregnancy in which albuminuria is present for less than four days before delivery is seldom followed by a severe toxæmia. If, however, albumin persists for more than four days before delivery in the first pregnancy, severe toxæmia frequently occurs in the subsequent pregnancy.

TABLE XVIII.

Percentage of Patients in the Various Toxæmias of Pregnancy who had a Subsequent Normal or Toxæmic Pregnancy.

Subsequent Pregnancy.	Initial Manifestation of Toxæmia.							
	Albuminuria "A".	Albuminuria "B".	Albuminuria "C".	Preeclampsia.	Eclampsia.	Accidental Hæmorrhage.	Pyelitis.	Total Number.
Normal	65%	49%	37%	33%	41%	24%	47%	237
Abortion	21%	20%	18%	15%	13%	—	17%	96
Mild toxæmia	7%	13%	7%	15%	9%	8%	4%	41
Severe toxæmia	7%	18%	38%	37%	37%	68%	4%	203
Recurrent pyelitis	—	—	—	—	—	—	23%	10
Total number	29	59	246	74	106	25	48	587

Statistical analysis of the data presented in Table VI in relation to the incidence of toxæmic pregnancy after an initial albuminuria of four to eight days' duration, proved that there was a definite danger of recurrence of toxæmia in the subsequent pregnancy. Ninety-three patients of the 246 who had albuminuria "C" as the initial toxæmia developed severe toxæmia in the next pregnancy (ratio 1:0·38) and forty-seven had severe toxæmia in still later pregnancies (ratio 1:0·19). In the preeclamptic group 27 of the 74 patients developed severe toxæmia in the following pregnancy (ratio 1:0·36) and 11 in later pregnancies (ratio 1:0·15). In the first pregnancy after an eclamptic pregnancy, 39 of the 106 patients developed severe toxæmia (ratio 1:0·37), and in later pregnancies there were 26 toxæmias (ratio 1:0·24). From these ratios it seems probable that there is an equal chance that toxæmia in a subsequent pregnancy will follow albuminuria "C", preeclampsia or eclampsia. In the later pregnancies the ratio of toxæmic subsequent pregnancies to the original toxæmic pregnancies is much greater in the case of eclampsia than in that of either albuminuria "C" or preeclampsia. Harris[1] and Sym[2] have stated that the prognosis after eclampsia is more favourable than that after preeclampsia; but Browne and Dodds[3] disagreed with this statement. To determine which of these views was supported by our results, the pregnancies immediately following eclamptic and pre-eclamptic pregnancies were submitted to statistical analysis, and it was found that there was no significant difference in the number of normal or toxæmic pregnancies following pregnancies complicated by either eclampsia or preeclampsia. A similar analysis of the later pregnancies following these two types of toxæmia indicated that possibly more toxæmic pregnancies occurred after eclamptic than after preeclamptic pregnancies. These results do not agree with those of Harris and Sym.

Are More Toxæmic Pregnancies likely to follow Two Consecutive Toxæmic Pregnancies rather than One?

In the groups "Albuminuria 'A'", "Albuminuria 'B'" and "Accidental Hæmorrhage" there were so few cases in which there were two consecutive toxæmic pregnancies followed by a third pregnancy that analysis of the results could not be made. Of the 246 patients in the group "Albuminuria 'C'", 110 had toxæmia in the next pregnancy, 91 had a normal pregnancy and 45 had abortions. Of the 110 toxæmic patients, toxæmia recurred in 31, one had a normal pregnancy, two aborted and 28 had no subsequent pregnancy. Of the 136 patients who after the initial toxæmia had a normal pregnancy or aborted, 15 had a subsequent toxæmic pregnancy, 28 a normal pregnancy, 22 aborted and 71 had no further pregnancy. Statistical analysis of these results shows that the likelihood of occurrence of a further toxæmia is significantly greater when two toxæmic pregnancies have already occurred.

Association between the Various Types of Toxæmia and the Incidence of Chronic Nephritis in Later Pregnancies.

Fifty-five of the 66 patients classified as having chronic nephritic toxæmia were so classified only after one or more toxæmic pregnancies had occurred. In two-thirds of them this did not occur until the fifth or still later pregnancy. An attempt was therefore made to correlate chronic nephritis and the type of toxæmia most likely to end in this condition. The number of patients developing chronic nephritic toxæmia following each type of toxæmia is set out in Table XIX.

TABLE XIX.

Incidence of Chronic Nephritis after Each Type of Toxæmia of Pregnancy.

Manifestation of Toxæmia.	Number of Patients with Initial Abnormality.	Number of Patients Developing Chronic Nephritis.	Percentage of Patients Developing Chronic Nephritis.
Albuminuria "A" ..	29	2	7
Albuminuria "B" ..	59	2	3
Albuminuria "C" ..	248	19	8
Preeclampsia	74	9	12
Eclampsia	106	8	7
Accidental hæmorrhage ..	25	1	4
Pyelitis	48	1	2

From this table it will be seen that the greatest number of cases of chronic nephritis are derived from the group "Albuminuria 'C'"; but this is explained by the fact that this group contains by far the greatest number of patients. The preeclamptic group seems to yield the greatest number of chronic nephritic toxæmias. Statistical analysis, however, shows that with the variation in the number of cases in each group the differences *per centum* are not highly significant. It is therefore not possible to predict that chronic nephritis is more likely to develop after any particular type of toxæmia.

Prediction of the Type of Subsequent Toxæmia from the Initial Toxæmia.

Inspection of Table XX shows that after toxæmic pregnancy 15% to 20% of the following pregnancies ended in abortion. After the mild toxæmias more than half of the patients had normal subsequent pregnancies, and when toxæmia did occur it was usually of the type "Albuminuria 'C'". No cases of preeclampsia or eclampsia occurred after mild toxæmias in this series. After the severe toxæmias (albuminuria "C", preeclampsia and eclampsia) only 35% to 40% of the subsequent pregnancies were

TABLE XX.

The Incidence of Normal and Toxæmic Pregnancy following an Initial Toxæmia.

Manifestation of Toxæmia.	Total Number of Original Patients.	Percentage of Patients Whose First Subsequent Pregnancy occurred in the Groups Specified.									
		Normal.	Abortions.	Albuminuria "A".	Albuminuria "B".	Albuminuria "C".	Pre-eclampsia.	Eclampsia.	Accidental Hæmorrhage.	Pyelitis.	Chronic Nephritis.
Albuminuria "A" ..	29	66	21	—	—	14	—	—	—	—	—
Albuminuria "B" ..	59	49	20	—	12	20	—	—	—	—	—
Albuminuria "C" ..	246	37	18	4	3	25	6	0·5	4	0·5	2
Preeclampsia	74	35	15	5	8	14	15	—	—	1	7
Eclampsia	106	41	13	5	1	14	9	11	—	2	3
Accidental hæmorrhage	25	25	—	4	4	29	8	4	21	—	4
Pyelitis	48	47	17	4	—	4	—	—	2	23	—

normal. Recurring toxæmia was, in the majority of cases, of the more severe type, and often of the same kind as the initial toxæmia. In the "Accidental Hæmorrhage" group there were more toxæmic than normal subsequent pregnancies. In addition, an equal number of persistently albuminuric pregnancies and recurrent accidental hæmorrhages occurred in the subsequent pregnancies.

It seems, therefore, that we are justified in stating that after mild toxæmias the likelihood that another toxæmic pregnancy will occur is not very great, and that if one occurs it will usually not be of a very severe type. If the first toxæmia is of the more severe type, there is a grave risk that the following pregnancy will be toxæmic, and frequently the second toxæmia will be of a similar type to the first one.

Renal Function Tests in the Initial Toxæmic and in Subsequent Pregnancies.

Initial Toxæmias.

By the use of suitable renal function tests it is possible to evaluate different degrees of kidney damage. Some kidney involvement, as shown by the presence of albumin in the urine, is an essential feature of the toxæmias and is often the first sign of developing toxæmia. On the other hand, it is frequently the last symptom to disappear, and the significance of the persistence of albumin in the urine has been discussed in another paper.[7] Severe renal damage is revealed by abnormal results to blood urea tests; but in the past not much attention has been paid to investigation of the intermediate stages of kidney damage. In this investigation the intermediate group has received special study, and it has been possible to gain valuable information in this direction by the routine performance of the urea concentration-excretion test. Even in the mild toxæmias 50% of the tests gave low values indicating a certain degree of kidney damage. In none of these cases was the kidney impairment so severe as to cause a rise in the blood urea level. In the "Severe Toxæmia" groups, 60% to 80% of the urea concentration-excretion tests gave low values, and in about one-third of these patients the damage to the kidney was so severe that the blood urea level increased above normal. In all groups except "Eclampsia" and "Chronic Nephritis" the kidney damage was transitory, since in most cases the kidney function rapidly improved during the puerperium (Table XXI). The graph in Figure I

TABLE XXI.

Abnormal Results of Renal Function Tests as Ratio of Results of Total Tests, Before and After Delivery, in the Different Manifestations of Toxæmia of Pregnancy.

Manifestation of Toxæmia.	*Ante Partum.*		*Post Partum.*	
	Blood Urea Level.	Urea Concentration Excretion.	Blood Urea Level.	Urea Concentration Excretion.
Albuminuria "A"	—	—	1/24	4/21
Albuminuria "B"	2/24	12/24	1/48	8/48
Albuminuria "C"	3/88	64/90	9/110	32/121
Preeclampsia	7/38	30/37	1/40	21/49
Eclampsia	6/18	7/11	9/28	20/59
Accidental hæmorrhage ..	—	2/3	3/13	6/20
Pyelitis (severe)	2/25	17/26	1/16	4/16
Chronic nephritis	14/56	47/54	12/43	32/46

consists of curves in which the percentages of abnormal results to renal function tests (blood urea tests, urea concentration-excretion tests and tests for albumin in the urine) are plotted against the time in relation to delivery in mild, moderately severe and very severe abnormalities of pregnancy. The mild toxæmias include albuminuria "A" and "B", the moderately severe toxæmias albuminuria "C" and preeclampsia, and the severe toxæmias eclampsia, the condition manifesting itself as accidental hæmorrhage and chronic nephritis. These curves show the value of the blood urea test in detecting severe renal damage, and of the urea concentration-excretion test when there is less gross damage. They also illustrate the value of the detection of albumin in urine in revealing very slight kidney involvement during pregnancy. The presence of albumin in the urine twelve months after toxæmic pregnancy indicates that some renal damage is still present.

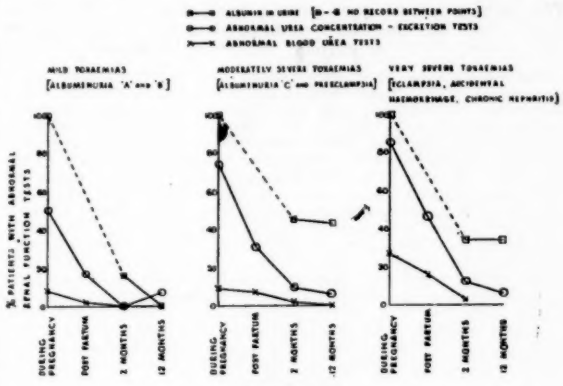

FIGURE I.

It has already been explained that 55 of the 66 patients in the "Chronic Nephritic" group had previously suffered from one or more toxæmic pregnancies. Very few patients became pregnant after they had been diagnosed as suffering from chronic nephritis. The renal function tests in this group produced a high percentage of abnormal results before delivery, and these results did not improve in the puerperium. These abnormal results persisted during the twelve months after delivery in the few cases investigated. In subsequent pregnancies poor renal function was again a noticeable feature. The history of a typical patient from this group is given in detail, since it adequately illustrates the course of events in such cases.

The patient, aged twenty-two years, had a history of measles, whooping cough and pyelitis. Her first pregnancy had resulted in a miscarriage at three months. In her second pregnancy (1935) she was admitted to hospital when twenty-eight weeks pregnant, and had albuminuria; but her blood pressure was normal. Her blood urea level was 45 milligrammes per 100 cubic centimetres, and the total excretion of urea was 3·6 grammes in three hours. (The average value for total excretion of urea after delivery lies between five and six grammes in three hours.)[7] A trace of albumin persisted in the urine for eight days and her blood pressure rose to 160 millimetres of mercury systolic and 90 millimetres diastolic. She was discharged from hospital on September 9, 1935. On September 28, 1935, she was readmitted to hospital, complaining of cramp-like pain over the whole of the abdomen. On examination she was found to have œdema of the legs and vulva. Her blood pressure had risen to 175 millimetres of mercury systolic and 120 diastolic, and pronounced albuminuuria was present. The patient was given eliminative treatment, and both the amount of albumin in the urine and the blood pressure diminished slightly. Repetition of renal function tests revealed increased renal damage. The blood urea content was 48 milligrammes per 100 cubic centimetres and the result of the urea concentration-excretion test was very poor, only 1·6 grammes of urea being excreted in three hours. Medicinal induction of labour resulted in the birth of a premature living baby. The patient was diagnosed as having had preeclampsia.

Three years later the patient was again pregnant. Tests performed when she was eight months pregnant revealed renal damage. The blood urea level was 25 milligrammes per 100 cubic centimetres and the total excretion of urea was 2·0 grammes in three hours. One month later the results of the tests were still poor; the blood urea level was 27 milligrammes per 100 cubic centimetres and the amount of urea excreted was 1·8 grammes. Two further investigations within the next week confirmed the severe renal involvement. The patient was finally delivered of a still-born baby and was found to have had a concealed accidental hæmorrhage. Tests after delivery revealed a great deterioration in kidney function. The blood urea level had risen to 62 milligrammes per 100 cubic centimetres and the urea concentration-excretion test produced a result of 3·6 grammes in three hours.

The improvement in urea excretion is not at variance with the high blood urea level and does not indicate improvement in renal function, since Harrison has observed that a high level of urea in the blood frequently causes the kidney to excrete more urea than it normally would. The persistence of poor renal function during the pregnancy and the increased damage detected after delivery are characteristic of chronic nephritic toxæmia.

Twelve months later the patient had renal function tests performed. The blood urea level was 51 milligrammes per 100 cubic centimetres and the Fowweather urea clearance test produced a result of only 30%. The persistence of renal damage so long after pregnancy is also characteristic of this type of toxæmia. Eighteen months after these tests, on September 30, 1940, the patient was again pregnant. At six weeks there was a trace of albumin in the urine and the blood pressure was 150 millimetres of mercury systolic and 110 diastolic. Her blood urea content was 45 milligrammes per 100 cubic centimetres, the amount of urea excreted in three hours was 2·5 grammes, and the Fowweather clearance test produced a result of 32%. The pregnancy was terminated. Two months later the patient's renal function was again investigated. The blood urea content was 60 milligrammes per 100 cubic centimetres, the amount of urea excreted was 3·3 grammes in three hours, the Fowweather urea clearance test produced a result of 27%, and the urine contained 7·5 grammes of albumin per litre. This patient did not return for further investigation.

In individual cases the renal function tests proved of great value in showing the response to treatment during a particular pregnancy and in indicating the necessity for termination of pregnancy when no improvement occurred. The persistence of poor renal function in the puerperium and for some time after the pregnancy is important in prognosis regarding subsequent pregnancies. For example:

A patient aged seventeen years, when twenty-eight weeks pregnant, had a trace of albumin in her urine and a blood pressure of 166 millimetres of mercury systolic and 108 diastolic. Renal function at this time was normal. Twelve days later the blood urea content had increased to 32 milligrammes per 100 cubic centimetres and the total excretion of urea had decreased to 3·1 grammes in three hours. In the thirty-fifth week of pregnancy the systolic blood pressure had risen to 180 millimetres of mercury, the urine was 50% solid with albumin, and the patient complained of pain in her eyes. After eliminative treatment the albuminuria decreased slightly; but the blood pressure remained high and the urea excretion fell to 1·5 grammes in three hours. Labour was induced and later the blood urea level rose to 58 milligrammes per 100 cubic centimetres. The patient had a typical eclamptic fit, and a living premature baby was born soon afterwards. By the next day the systolic blood pressure had dropped to 130 millimetres of mercury, and there was only a trace of albumin in the urine. Seven days after delivery the blood urea level was 45 milligrammes per 100 cubic centimetres and the urea excretion was only 3·2 grammes in three hours. The patient was not tested after her discharge from hospital.

One year later the patient again became pregnant, but abortion occurred in the eighth week of the pregnancy. One year after this a second abortion occurred when the patient had been pregnant for three months. Four years later, when the patient was sixteen weeks pregnant, she complained of headache and of spots before her eyes; her blood pressure was 156 millimetres of mercury systolic and 84 diastolic, but there was no albumin in the urine. The results of renal function tests at this time were very good. Two months later the blood pressure had risen to 204 millimetres of mercury systolic and 134 diastolic, and the urine when boiled was solid with albumin. Renal efficiency tests revealed pronounced renal damage, the blood urea content being 50 milligrammes per 100 cubic centimetres and the urea excretion only 1·9 grammes in three hours. Labour was induced and the patient was delivered of a premature baby, which died shortly afterwards. During the puerperium the kidney function improved greatly, although it was still not normal. The patient was not tested twelve months after pregnancy.

Two years after this pregnancy she was admitted to hospital and thought she was about one month pregnant. The pregnancy was confirmed by a positive response to the Aschheim-Zondek test. She complained of severe headache, frequency of micturition and soreness in the breasts. The urine contained no albumin, but the systolic blood pressure was 180 millimetres of mercury. After treatment the systolic blood pressure fell to 138 millimetres of mercury, but renal function was very poor. The blood urea content was 35 milligrammes per 100 cubic centimetres, the Fowweather clearance test produced a result of 56% (average normal function) and the urea excretion was 3·2 grammes in three hours. The pregnancy was therefore terminated. Two months later renal function tests still indicated persistence of renal damage, and there was 0·5 gramme of albumin per litre in the urine. She has been advised to report for further tests so that complete information regarding her kidney function will be available for use in deciding whether further pregnancies, if they occur, shall be allowed to continue.

Subsequent Pregnancies.

In Table XXII abnormal results to blood urea tests in the ante-partum and post-partum periods of the initial pregnancy are correlated with those in the normal subsequent pregnancies as well as those in the abnormal pregnancies. In the normal subsequent pregnancies the blood urea level is seldom raised in either the ante-partum or the post-partum periods; this shows that no gross renal damage has persisted from the initial toxæmia. In subsequent toxæmic pregnancies there was about the same proportion of abnormal results to blood urea tests as in the initial abnormal pregnancy.

Table XXIII correlates the data for the same periods as in Table XXII when the kidney function was assessed by the urea concentration-excretion test. In normal subsequent pregnancies one-third of the total tests in the ante-partum period and one-fifth of those in the puerperium indicated renal involvement.

In the paper previously mentioned[3] it has been shown that the amount of urea excreted decreases from 6·7 grammes in three hours to an average of 5·3 grammes in three hours even in normal pregnancy without any history of toxæmia. Since only tests in which the urea excretion was shown to be less than four grammes in three hours have been classified as indicating renal inefficiency, it can safely be concluded that these results suggest that some degree of renal damage has persisted as the result of the initial toxæmia. In subsequent toxæmic pregnancies the proportion of patients with renal inefficiency is less before delivery, but is of about the same order in the puerperium. These results would seem to indicate that the renal damage was due to each individual toxæmia. Two facts must be considered before this conclusion can be accepted: (i) Many patients had no subsequent pregnancies, and amongst these may have been included those with the most severe and possibly more permanent renal damage. (ii) The second toxæmia is not in all cases as severe as the first toxæmia; hence the renal dysfunction may frequently be due to the initial toxæmia rather than to the second toxæmia.

Among patients who had pregnancies subsequent to a pregnancy in which chronic nephritis was diagnosed, the renal condition deteriorated with each subsequent toxæmia, and it did not clear up in the period between pregnancies. Five-sixths of these patients developed this condition after one or more toxæmic pregnancies. Together with the evidence of renal inefficiency obtained in normal pregnancies following an initial toxæmic pregnancy, it seems reasonable to conclude that the initial toxæmia does cause some degree of permanent renal damage.

Births.

The percentages of living babies, both premature and those born at term, the stillbirths and the abortions resulting from the pregnancies in the various types of toxæmias studied, are correlated in Table XXIV. Interesting features in this table are the number of stillborn babies in all groups; there is a definite increase above the average of about 4% of stillbirths amongst the total number of hospital deliveries. There were more than 10% of stillbirths in each group. In most cases the figure varied from 15% to 20%. In the eclamptic group the figure of 25% is particularly high, but may be partly due to the large doses of sedatives used in controlling such cases. Sixty-four *per centum* of stillbirths occurred in the "Accidental Hæmorrhage" group, and in this condition the premature separation of the placenta is responsible for the high incidence of stillbirths. The large percentage of stillbirths in chronic nephritis (30%) is more difficult to explain.

TABLE XXII.

Correlating Abnormal Results of Blood Urea Tests in the Initial Toxæmic Pregnancy with those obtained in Subsequent Normal and in Subsequent Toxæmic Pregnancies.

Type of Toxæmia.	Initial Toxæmia.						Subsequent Normal Pregnancies.						Subsequent Toxæmic Pregnancies.					
	Ante Partum.			*Post Partum.*			*Ante Partum.*			*Post Partum.*			*Ante Partum.*			*Post Partum.*		
	Total Tests.	High Values.	Ratio.	Total Tests.	High Values.	Ratio.	Total Tests.	High Values.	Ratio.	Total Tests.	High Values.	Ratio.	Total Tests.	High Values.	Ratio.	Total Tests.	High Values.	Ratio.
Mild toxæmias: Albuminuria "A" and "B"	24	2	1/12	69	2	1/34	7	0	0/7	7	2	1/4	11	0	0/11	11	1	1/11
Albuminuria "C"	88	3	1/29	110	9	1/12	23	0	0/23	11	0	0/11	77	7	1/11	84	7	1/12
Preeclampsia	38	7	1/5	40	1	1/40	10	0	0/10	—	—	—	23	4	1/6	20	2	1/10
Eclampsia	18	6	1/3	28	9	1/3	24	1	1/24	16	3	1/5	34	6	1/5	31	4	1/8

TABLE XXIII.

Correlating Abnormal Results of Urea Concentration—Excretion Tests in the Initial Toxæmic Pregnancy with those in Subsequent Normal and in Subsequent Toxæmic Pregnancies.

Type of Toxemia.	Initial Toxæmia.						Subsequent Normal Pregnancies.						Subsequent Toxæmic Pregnancies.					
	Ante Partum.			*Post Partum.*			*Ante Partum.*			*Post Partum.*			*Ante Partum.*			*Post Partum.*		
	Total Tests.	Low Values.	Ratio.	Total Tests.	Low Values.	Ratio.	Total Tests.	Low Values.	Ratio.	Total Tests.	Low Values.	Ratio.	Total Tests.	Low Values.	Ratio.	Total Tests.	Low Values.	Ratio.
Mild toxæmias: Albuminuria "A" and "B"	24	12	1/2	69	12	1/6	7	2	1/4	2	1	1/2	13	6	1/2	11	4	1/3
Albuminuria "C"	90	64	1/1·4	121	32	1/8	23	9	1/3	15	4	1/4	81	29	1/3	86	22	1/4
Preeclampsia	37	30	1/1·2	49	21	1/2	11	3	1/4	—	—	—	32	16	1/2	25	12	1/2
Eclampsia	11	7	1/1·6	59	20	1/3	24	6	1/4	18	2	1/9	31	11	1/3	31	10	1/3
Total tests	162	113	1/1·4	298	85	1/3·5	65	20	1/3·2	35	7	1/5	157	62	1/2·5	153	48	1/3·2

The number of premature babies amongst the albuminuric patients rises steadily from the mildest form to preeclampsia (3% to 30%). This figure drops to 17% in eclampsia. The rise has probably nothing to do with the toxæmias themselves, but is concerned with the induction of premature labour, which is used more frequently the more severe the toxæmia becomes. The generally adopted procedure not to interfere in eclamptic cases is shown in the drop from 30% to 17% from the preeclamptic to the eclamptic groups. In addition, 13 premature babies died within a few days of birth.

In the abnormalities of pregnancy studied, 418 living children were born as the result of 651 pregnancies—that is, only 64%. The variations in the different groups are considerable, ranging from 24% in accidental hæmorrhage, 39% in chronic nephritis and 66% in eclampsia to over 80% in the mild toxæmias. Special attention must again be drawn to the chronic nephritic patients, amongst whom, in addition to the fact that 39% of living babies were born and 30% of the babies were stillborn, 31% of the pregnancies had to be terminated before the fœtus was viable.

The Results of Subsequent Pregnancies.

An interesting observation in the investigation of the results of subsequent pregnancies is the high incidence of abortions (20% to 30%). Otherwise the effect of toxæmia in later pregnancies in relation to the birth of living, premature or stillborn babies seemed to depend more on the type of the current toxæmia than on the type of the previous toxæmia.

CONCLUSIONS.

The conclusions which can be drawn from the observations presented and from the discussion may be summarized as follows.

In this series most of the patients were aged under thirty years (507 out of 651) and the majority had the initial toxæmia during their first pregnancy.

It was thought that the occurrence of a toxæmia might possibly lead to a decrease in the number of subsequent pregnancies. Such a result might be due to the direct effect of the toxæmia, or the occurrence of a severe toxæmia might deter many women from bearing further children. Examination of the subsequent histories of this group of patients has shown that no significant decrease in the number of later pregnancies is to be found in the toxæmic pregnancies as a whole, or after a particular type of toxæmia, with the possible exception of that which gives rise to accidental hæmorrhage. In this

TABLE XXIV.

Showing the Results of Pregnancy in the Various Types of Toxæmia.

Result of Pregnancy.	Initial Manifestation of Toxæmia.							
	Albuminuria "A".	Albuminuria "B".	Albuminuria "C".	Pre-eclampsia.	Eclampsia.	Accidental Hæmorrhage.	Pyelitis.	Chronic Nephritis.
Living babies (at term)	82%	75%	53%	51%	50%	11%	50%	12%
Living babies (premature)	3%	10%	18%	30%	17%	13%	18%	27%
Total living babies	85%	85%	71%	81%	67%	24%	68%	39%
Stillbirths	11%	10%	17%	14%	25%	64%	14%	30%
Abortions	0%	0%	2%	—	2%	4%	3%	31%
Result unclassified	4%	5%	10%	5%	7%	8%	15%	—
Total number of patients in each group	27	59	246	74	106	25	48	66

condition the number of patients was too small to give conclusive proof.

Whilst it can be accepted that the occurrence of toxæmias does not reduce the number of subsequent pregnancies, they certainly have an influence on the type of the following pregnancy. It has been shown that the severe toxæmias are followed by a greater number of toxæmic than normal pregnancies. This is particularly the case when the initial toxæmia is of the type that causes accidental hæmorrhage. In the groups "Albuminuria 'C'", preeclampsia and eclampsia, the risk that severe toxæmia will follow the initial toxæmia is still high, and is equally present in any of these three conditions. This finding does not agree with the results stated by Harris and Sym, but confirms the conclusions of Browne and Dodds. In contrast to the results published by Harris, our figures show that in subsequent pregnancies a greater number of toxæmias occur after eclampsia than after preeclampsia.

Further analysis of the remote pregnancies has shown that when the first subsequent pregnancy was normal or ended in abortion, few toxæmias occurred in later pregnancies except when the initial toxæmia had been eclampsia. When the first subsequent pregnancy is toxæmic, a considerable number of toxæmias occur in the following pregnancies. These observations support Young's suggestion that if two toxæmic pregnancies occur further pregnancies should be prevented.

Since the development of chronic nephritis is a most serious sequel to a series of pregnancies in any case, it was hoped to gain some information about the particular type of toxæmia most frequently resulting in this complication. However, analysis has shown that no such conclusion can be drawn from the material available.

It would be a great advantage if it were possible to predict to some extent the course of the pregnancies that follow an initial toxæmic pregnancy. A definite prediction is impossible; but the evidence collected supports the following statements. The mild toxæmias are seldom followed by toxæmia in later pregnancies; but if toxæmia does occur it is usually of a milder type. When severe toxæmia has occurred there is a probability of recurrence in later pregnancies. The toxæmia will often be severe and frequently of the same type as the initial toxæmia.

One observation is likely to be of value in such predictions: the earlier the albuminuria appears in the initial toxæmia and the longer it persists, the greater is the chance of recurrence of toxæmia. This has already been stressed by Sym, and it has been stated that pregnancy should be terminated if albuminuria persists for three weeks or longer. It has been proved from our observations that if albuminuria persists for as short a time as four to eight days, the risk of later toxæmic pregnancies is definitely increased. It has therefore become the practice in this hospital to curtail the time in which a patient is allowed to continue pregnancy with albuminuria which fails to respond to treatment. From the original limit of three weeks the time has gradually been reduced until now pregnancy is usually terminated when albuminuria fails to respond to treatment within five days.

One of the most important factors in the course of a toxæmia is kidney function. In the evaluation of renal efficiency the use of the tests for albumin in the urine and the amount of urea in the blood have not given sufficient information. While detection of albumin in the urine is often the earliest sign of the existence of toxæmia, it gives little further information during the course of the toxæmia. High blood urea values occur only when the kidney damage has become very pronounced. Frequently such high values occur only in the late stages of the toxæmia, sometimes too late for successful therapy. The urea concentration-excretion[(2)] and Fowweather clearance tests offer a valuable means for detecting intermediate as well as gross degrees of kidney damage and give information regarding improvement or deterioration of the kidney function. A detailed analysis of these renal function tests is to be found in the paper previously mentioned. Their practical value has been illustrated by the two cases described above. In such individual cases, as well as in their general application, these tests have shown what an important role the kidney plays in all the toxæmias. As normal results to the tests are not infrequently encountered in toxæmic pregnancy, it is evident that in spite of its importance the kidney is certainly not the primary cause of the toxæmias.

The most serious result revealed by the analysis of the birth figures is that in 651 toxæmic pregnancies only 418 living babies were born. This amounts to not more than 64% of living babies among this group of patients. Another noteworthy feature is the high incidence of abortions in subsequent pregnancies. Such figures, at a time when emphasis is being laid on the need for increasing the population, indicate the necessity for further research into the cause and therapy of the toxæmias as one of the foremost obstetrical problems.

ACKNOWLEDGEMENTS.

We are indebted to the National Health and Medical Research Council of Australia for the grants which made this work possible.

We wish to thank Dr. Mildred Barnard, Statistician to the Council for Scientific and Industrial Research, for the statistical analyses involved in this investigation. Our thanks are also due to Dr. H. Bettinger, Director of the Pathology Department, Women's Hospital, for his help in the preparation of this paper.

REFERENCES.

(1) J. W. Harris: "The After Effects of the Late Toxæmias of Pregnancy", *The Bulletin of the Johns Hopkins Hospital*, Volume XXXV, 1934, page 103.

(2) J. Young: "The Prognosis and Treatment of Eclampsia and Albuminuria", *The British Medical Journal*, Volume I, 1929, page 91.

(6) J. C. B. Sym: "The Ultimate Prognosis in Eclampsia and Albuminuria of Pregnancy", *The Lancet*, October 5, 1929, page 698.
(6) G. F. Gibberd: "The Relation between Recurrent Albuminuria, Chronic Nephritis and the Toxæmias of Pregnancy", *The British Medical Journal*, Volume I, 1929, page 674.
(6) F. J. Browne and G. H. Dodds: "The Remote Prognosis of the Toxæmias of Pregnancy", *The Journal of Obstetrics and Gynæcology of the British Empire*, Volume XLVI, Number 3, 1939, page 443.
(6) V. I. Krieger: "The Interpretation of Maclean's Urea Concentration Test in the Assessment of Renal Function in Pregnancy", THE MEDICAL JOURNAL OF AUSTRALIA, March 26, 1938, page 557, and April 2, 1938, page 597.
(7) V. I. Krieger and N. Norris: "Renal Function Tests in Normal and Toxæmic Pregnancy" (to be published).

A NOTE ON THE INFLUENCE OF SURGICAL OPERATIONS ON THE DIPHTHERIA ANTITOXIN CONTENT OF BLOOD SERUM.

By E. SINGER,
From the Baker Institute of Medical Research, Alfred Hospital, Melbourne.

IMMUNIZATION against tetanus and gas gangrene adds some new problems to the question of active immunization. The main difference between these recently introduced immunizations and that against diphtheria is the strict individual protection in the former cases and the protection afforded by mass immunity in the latter. Mass protection safeguards even individuals who for some reason or other have failed to develop an immunity. That occasionally even the most intensive form of diphtheria immunization, as judged by the appearance of antitoxin in the serum, may fail, is well known. According to different statistics the percentage of failures varies from 5 to 20, and particularly persons who have no preformed antibodies are known to be very difficult to immunize. Failure in immunization may to some extent be explained by the results of Prigge,(1) who in intensive animal experiments found that the immunity response of guinea-pigs to diphtheria anatoxin varied between 1 and 32,000.

Apart from the above, persons with a reasonably high antibody level may occasionally contract diphtheria, and it is impossible to explain this along orthodox immunological lines. Naturally the somewhat vague explanation has been advanced that the initial high antitoxin titre observed in such cases is rendered unstable by "adverse extraneous causes". In the largest and most carefully checked statistics, chiefly from European sources, particularly those of Wohlfeil *et alii*(2) covering more than 140,000 immunized children, the ratio of infections in the immunized group against the non-immunized controls varied from 1:4 to 1:16.

In some unpublished experiments that were undertaken to test the immunizing potency of different preparations against diphtheria, it was found that some of the volunteers reacted to the injection of plain anatoxin, alum-precipitated anatoxin or mixed vaccines, with a pronounced "negative" phase. In some cases the total loss of antibody calculated on the basis of blood volume amounted to 200 to 250 antitoxic units (A.U.). Such losses are too great to be explained by the classical theory—namely, a specific combination of antibody with injected antigen. In some experiments a similar fall in antitoxin was found after the injection of unrelated antigens, such as "T.A.B."

In view of the fact that the specific factors of this particular antitoxic immunity could be influenced in this manner, it seemed to be of importance, in relation to present conditions, to know whether antitoxin against tetanus and *Clostridium welchii* toxin could be influenced by extraneous causes, such as trauma and shock. Unfortunately animal experiments are of little value in this direction, and further, it is not possible here to test directly the behaviour of antitoxin in human serum, since non-immunized humans do not as a rule develop antitoxins against tetanus and *Clostridium welchii*. It was thought, however, that some information might be gained by studying the diphtheria antitoxin content of the serum of patients undergoing surgical operations. The results should be an index of the behaviour of an antitoxic immunity.

With the kind collaboration of various members of the honorary surgical staff of the hospital it was possible to test the serum of patients undergoing operations at the Alfred Hospital. The first sample of blood was taken on the day preceding, the second sample six to twenty-eight hours after operation. The samples were kept overnight in the refrigerator and the serum was tested for diphtheria antitoxin by the usual intradermal method in guinea-pigs. At the same time the refractive index, the total protein content and the total globulin content were estimated. The results are summarized in Table I.

From the figures in this table it can be seen that the usual surgical interventions do not alter to any appreciable degree the protein content or the proportion between the different protein fractions. The changes in antibody content cannot be explained therefore by quantitative changes in the amount of circulating globulin, but must be caused by differences in the constitution of the freshly produced globulin. The sudden and severe changes observed give an interesting sidelight on the extreme speed with which the turnover of serum globulin must occur. Loss of globulin from the circulation and replacement must take place within a few hours.

Decreases in the antibody content were observed in 20 out of 41 cases. An increase in antitoxin titre after operation was observed three times. It is doubtful whether Case XXXIV can be used at all in this connexion because the post-operative sample was taken considerably later than usual (thirty-six hours after operation), so that the disturbance caused by the operation had had ample time to disappear.

No correlation could be observed between severity of surgical intervention and drop in antibody content, but a distinct correlation exists between the original antibody titre of the patient's serum and the decrease caused by the operation. In 15 patients with an antibody titre of 1/20 A.U. or more, a decrease after operation could be observed three times, whilst in 26 patients with antibody titres below 1/20 A.U., a decrease in titre after operation occurred in 12.

Whether the reason for the greater frequency of decrease in antibody content in the serum of patients with low initial antibody titre is an inherent defect in production of antibodies, or whether a high titre of antitoxins produced by stronger, silent immunization is more resistant against the damaging influences of surgical shock, cannot be decided with certainty. It is more probable that individuals who produce antibodies with greater ease and therefore have higher titres of antitoxin in their serum are also more resistant against damaging influences, or that the damage done passes off more quickly.

Summary.

The serum of patients undergoing various operations was tested for content of antibody against diphtheria toxin before and within twenty-eight hours after operation. A decrease in titre was observed in one-fifth of the cases when the antibody titre was higher than 1/20 A.U. and in one-half of the cases when the titre was lower.

The observations suggest that active immunization against non-communicable diseases, such as wound infections with anaerobes, will probably have their lowest value immediately after the wounding.

References.

(1) R. Prigge: *"Theorie und Methodik der Antigenmessung", Proceedings of the Second International Congress of Microbiology*, 1936, page 384.
(2) T. Wohlfeil *et alii*: *"Die Diphtheriesuchenwelle in Deutschland und ihre Bekämpfung mittels der aktiven Schutzimpfung", Veröffentlichungen aus dem Gebiete des Volksgesundheitsdienstes*, Volume LII, 1939, page 391.

TABLE I.

Case Number.	Sex.	Age. (Yrs.)	Operation.	Anæsthesia.		Antitoxin.		Refractive Index.		Total Nitrogen.		Globulin.	
				Type.	Duration.	Before.	After.	Before.	After.	Before.	After.	Before.	After.
Patients with antitoxin content higher than 1/20 unit.													
I	M.	50	Laminectomy.	——	—	1/10	1/100	57·2	61·5	—	—	—	—
II	M.	—	Herniorrhaphy.	"Open" ether.	30 mins.	1/20	1/50	59·8	61·2	7·0	7·82	3·2	3·8
III	F.	16	Hammer toes.	"Open" ether.	30 mins.	1/5	1/5	58·8	56·4	8·0	7·8	4·2	4·0
IV	F.	40	Abdominal hysterectomy.	Spinal.	—	1/20	1/50	55·2	55·6	7·0	7·8	3·0	3·2
V	M.	—	Removal of piles.	Ethylene.	15 mins.	1/20	1/20	54·3	54·4	—	—	—	—
VI	F.	27	Posterior colpotomy.	"Open" ether.	45 mins.	1/20	1/20	54·2	54·6	—	—	—	—
VII	F.	37	Adenoma of thyreoid.	Ethylene.	30 mins.	1/20	1/20	51·2	64·3	6·3	7·0	—	—
VIII	M.	39	Amputation of finger.	"Open" ether.	45 mins.	1/20	1/20	58·1	63·0	6·86	8·0	—	—
IX	F.	42	Vaginal hysterectomy.	Spinal.	—	1/20	1/20	58·4	60·2	7·3	7·8	3·1	3·1
X	M.	56	Ileo-caecal anastomosis.	Ethylene.	45 mins.	1/20	1/20	56·4	58·9	7·2	8·0	—	3·2
XI	M.	40	Right inguinal hernia.	"Open" ether and ethyl chloride.	45 mins.	1/20	1/20	54·0	59·2	7·2	6·8	3·2	3·0
XII	M.	38	Appendicectomy.	"Open" ether and ethyl chloride.	30 mins.	1/20	1/20	57·5	58·2	7·3	7·1	3·0	2·9
XIII	F.	48	Hysterectomy for carcinoma.	Spinal.	—	1/20	1/100	61·7	59·0	6·7	6·9	2·4	2·8
XIV	F.	30	Vaginal plastic.	Spinal.	—	1/20	1/20	58·2	59·6	6·8	6·8	3·0	2·8
XV	F.	40	Vaginal plastic.	Spinal.	—	1/10	1/10	62·5	62·0	6·7	6·8	—	—
Patients with antitoxin content below 1/20 unit.													
XVI	M.	43	Astragaloid arthrodesis.	"Open" ether.	1 hr.	1/50	1/50	58·3	60·0	7·2	8·1	3·2	4·0
XVII	M.	49	Nephrectomy.	"Open" ether.	2 hrs.	1/100	1/500	61·3	62·2	8·0	7·9	4·1	4·3
XVIII	M.	40	Herniorrhaphy.	"Open" ether.	30 mins.	1/500	1/500	62·2	61·2	7·6	7·5	3·1	3·3
XIX	F.	50	Pelvic carcinoma; abdominal removal.	Spinal.	—	1/50	1/250	58·4	62·2	7·3	7·5	3·2	3·0
XX	M.	56	Laparotomy.	"Open" ether.	30 mins.	1/100	1/250	61·8	55·7	7·3	7·6	2·8	3·0
XXI	M.	43	Same as Case XVI. Reapplication of plaster cast and correction.	"Open" ether.	30 mins.	1/50	1/250	60·2	62·1	7·4	7·4	3·1	3·1
XXII	M.	31	Herniotomy.	"Open" ether.	30 mins.	1/500	0	60·8	57·2	6·9	7·3	3·0	3·0
XXIII	F.	48	Abdominal total hysterectomy.	Spinal.	—	1/100	1/100	58·2	59·6	6·9	7·4	2·8	—
XXIV	F.	40	Abdominal total hysterectomy.	Spinal.	—	1/100	0	59·6	64·3	7·6	7·6	2·9	2·6
XXV	F.	44	Carcinoma of cervix; radium implantation.	Spinal.	—	1/100	1/100	60·0	58·0	7·1	7·0	2·9	3·0
XXVI	F.	65	Cholecystectomy.	Ethylene.	30 mins.	1/100	1/250	54·2	57·0	6·3	6·5	2·3	—
XXVII	M.	32	Herniorrhaphy.	Subcutaneous and "open" ether.	45 mins.	1/100	1/100	57·8	61·2	7·2	7·6	3·0	3·0
XXVIII	M.	33	Herniotomy.	Ethylene.	35 mins.	1/50	1/50	65·4	68·2	7·8	8·5	3·2	3·6
XXIX	F.	61	Fothergill's repair.	Spinal.	—	1/100	0	63·2	64·0	8·2	8·2	—	—
XXX	F.	58	Vaginal plastic.	Spinal.	—	1/100	1/500	53·0	56·1	7·3	7·2	—	—
XXXI	M.	54	Herniotomy.	Local.	—	1/100	1/500	55·8	55·2	6·8	6·7	2·5	2·8
XXXII	F.	42	Electrocoagulation of carcinoma of cervix.	——	—	1/100	1/250	59·0	58·2	6·7	7·1	2·8	3·0
XXXIII	F.	40	Vaginal plastic.	Spinal.	—	1/50	1/100	63·0	60·0	7·3	7·0	3·0	2·8
XXXIV	M.	56	Resection of peptic ulcer.	Spinal.	—	1/50	1/100	58·0	59·0	6·7	6·6	—	—
XXXV	F.	50	Colpoperineorrhaphy.	Spinal.	—	1/100	1/100	62·5	62·0	6·7	7·0	—	—
XXXVI	F.	26	Resection of ovary, appendicectomy.	Spinal.	—	1/100	1/500	—	—	—	—	—	—
XXXVII	F.	52	Hysterectomy.	Spinal and "open" ether.	45 mins.	1/100	1/500	—	—	—	—	—	—
XXXVIII	F.	54	Vaginal plastic.	Spinal.	—	1/100	1/250	—	—	—	—	—	—
Patients with increase in antitoxin titre.													
XXXIX	F.	50	Vaginal plastic.	Spinal.	—	1/500	1/250	57·2	57·8	7·4	7·8	3·2	3·3
XL	M.	39	Orthopædic.	"Open" ether.	30 mins.	1/100	1/50[1]	61·5	59·3[1]	—	—	—	—
XLI	F.	35	Colpoperineorrhaphy.	Spinal.	—	1/500	1/250	56·3	60·2	6·6	8·5	—	—

[1] Sample taken thirty-six hours after operation.

Reports of Cases.

A CASE OF IRIDOCYCLITIS WITH PARALYSIS OF THE SPHINCTER PUPILLÆ FOLLOWING VARICELLA.

By F. J. B. MILLER,
Adelaide.

Clinical Record.

J.W., AGED fourteen years, was seen on April 24, 1940, at the request of Dr. L. L. Davey. The boy was convalescent from chickenpox, but it had been noted that he had had a dilated pupil and slightly injected eye for a week. When he was examined at his home the right pupil was found to be about three-quarters dilated and to react very slightly to light; it was observed that numerous keratitic precipitates were present and that the vision was hazy, but the visual acuity was not estimated at that visit. The left eye was normal. The boy was given atropine and sodium salicylate.

Five days later vision in the right eye was 6/18 and with a −1·0 sphere it was 6/12. Apparently he had some ciliary spasm due to congestion of the ciliary body. A week later the keratitic precipitates had almost disappeared. The atropine and sodium salicylate were then discontinued.

A month after the boy had first been seen by me the eye was quiet, the fundus and media were clear and the keratitic precipitates were gone; but the pupil was still dilated, although it contracted readily with eserine. Weak pilocarpine drops were then tried at home, but he could not tolerate them. His physician reported that he could

find no evidence of tuberculosis, nor could any septic focus be found.

On December 17, 1940, visual acuity was 6/3 and Jaeger 1. The right eye had seven diopters of accommodation as compared with 11 diopters in the left eye. The pupil was still dilated and reacted very slightly to light. The iris was a little atrophic looking; the fundi were healthy and the patient had good binocular vision.

Discussion.

The association of iridocyclitis with paralysis of the pupil and accommodation in cases of varicella must be very rare. I could find no recent reference to it in the literature at my disposal.

Reviews.

WOUND INFECTION IN WAR SURGERY.

THE LANCET "War Primer on Wound Infection" contains a remarkable wealth of information and will prove to be of great value to all surgeons who are concerned with the problems which arise in the treatment of war casualties.[1] Of the seven chapters it contains, three are contributed by the editor, W. H. Ogilvie. In the first he discusses the problems of wound infection, sketching shortly but vividly the surgical attitude to these problems down through the ages, in Listerian days and thereafter up to the present time. The lessons of the last war, he points out, may be summarized in the full recognition of the fact, perhaps first stressed by Gamgee in 1887, that "the great antiseptic is life. The living tissues have a natural preservative power which, if guarded and conserved by the surgeon on physiological principles, offers the surest guarantee for healthy repair . . ." Among the more recent developments which have modified procedure, it is pointed out, are the recognition that the streptococcus stands alone in its ability to establish itself in vital tissues, the introduction of the sulphonamides and the wider employment of the closed plaster technique. There are undoubtedly many questions still to be answered: where, when, by whom and by what method is the all-important first wound treatment to be carried out; but the mere formulation of these questions is in itself salutary and stimulating.

In a chapter dealing with the biological aspect Whitby surveys the conditions which affect, favourably or adversely, the conversion of a contaminated wound into one capable of healing by first intention, that is, those which contribute to successful excision. Cruickshank discusses the bacteriology of war wounds. He furnishes a striking and very timely reminder of the value of close cooperation between the surgical unit and the laboratory, giving practical advice as to the means to be employed to secure full value from this partnership. Much useful information is contained in this chapter in reference to both general and specific prophylaxis and treatment.

A section on antiseptics by Garrod furnishes the answers to many questions that every surgeon must have asked himself. Professor Garrod remarks that the use of antiseptics by most surgeons is directed "more by ritual than by reason" and it is a safe assertion that these pages will be read with as much interest and profit as any in the monograph. The properties of the six main groups of antiseptics are contrasted, and in this the advantages of the acridine compounds appear overwhelming.

In Section V, on chemotherapy, is found an authoritative statement by Buttle upon the present position of treatment by drugs of the sulphanilamide group employed both in general treatment and by local application.

In the two final chapters, again from Ogilvie's pen, he deals with surgical principles and procedure in such telling fashion that no one can resent the didactic tone he has deliberately adopted in the interests of clarity. A description of general operative technique includes a sound and reasoned discussion of the methods in general use to prevent the introduction of infection at operation. Following upon this is a description of the methods to be employed in the treatment of accidental and war wounds, whether simply contaminated or the site of established infection. His description of the method of wound excision is lucid and altogether admirable. If one small criticism is permissible, it is that the use of the term *débridement*, as synonymous with excision, is perhaps confusing to those unfamiliar with the procedures or with current controversy. This section contains matter that concerns not only the surgeon, but also the administrator. Time is always the essence of the contract in treatment of the contaminated wound, and the early establishment of contact between the wounded man and the surgical team is of overwhelming importance.

It is pointed out that primary wound closure has a very limited application in war surgery, particularly in times of stress, and the merits of the different methods of treatment of the unclosed wound receive full consideration. Of these, the Carrel-Dakin method is much less suitable to war wounds and war conditions than to the casualties of civil life, and under any method the most complete immobilization, whether by splintage or by plaster, is of paramount importance.

It is pleasing to find a clear distinction drawn between gas gangrene and gas infection, the former being very properly described as a clinical diagnosis rather than a pathological entity. Radiological diagnosis and treatment are assigned to their proper place in relation to these two conditions.

Three short but useful appendices deal with antiserum, the use of the sulphonamide derivatives and the treatment of burns.

This primer can be unreservedly recommended to the attention not only of those younger surgeons who are or who may be concerned with the casualties of the present war, but to all who deal with the traumatic (and other) surgery of civil life. To many of these latter who served an apprenticeship in the last war chords of memory will stir in appreciation with the reading.

[1] "War Primer on Wound Infection: Its Causes, Prevention and Treatment", by W. H. Ogilvie, Robert Cruickshank, Lawrence P. Garrod, L. E. H. Whitby, G. A. H. Buttle; 1940. London: The Lancet Limited. Demy 8vo, pp. 96. Price: 2s. 9d. net.

WAR SURGERY.

THE first part of "Surgery of Modern Warfare"[1] deals with the general and special considerations of wounds, and the names of the contributors to this and the several other parts which are shortly to become available are sufficient guarantee of the authoritative nature of the work.

If any one feature can be singled out for special approbation it is the attention to detail manifest throughout and the clarity that results therefrom. Wherever practical experience gained in the last war is of value, it is set forth by those who gained it then, and where newer methods have proved of greater value, they are dealt with by those best qualified to write of them. Again, where doubt still exists, the nature of the unsolved problem is clearly set forth.

After a description and classification of war wounds and the agents responsible for them, the problem of shock, its causation and treatment, has an early place amongst the general considerations. The considerable superiority of plasma over whole blood transfusion in shock unassociated with hæmorrhage is strongly maintained. Very full consideration is given in the following chapter to transfusion and infusion, and this chapter in particular is remarkable for the wealth of those apparently small details which are so essential to smooth working in this field. The technique of blood grouping and direct matching in both blood and plasma transfusions is admirably described. Timely warning is given of the safe limits in the use of universal donor blood or plasma, and attention is directed to certain risks, other than those due to faulty grouping. Such risks are perhaps not generally recognized, nor is the fact that a mortality rate of perhaps 0·1% is associated with this operation.

The subject of anæsthesia is treated in most practical fashion. The chapter is a short one, but is well worth the study of those who may be called upon to give anæsthetics under war conditions.

The treatment of burns has assumed a vastly greater importance in this war, and this subject is admirably handled by Rear-Admiral C. P. G. Wakeley, who has recently added to his previous experience. The value of the triple dye treatment in conjunction with tannic acid is stressed, as is the inadvisability of tanning in certain types of burn. The important part played by radiography in war surgery is well

[1] "Surgery in Modern Warfare", edited by Hamilton Bailey, F.R.C.S.; Part I; 1940. Edinburgh: E. and S. Livingstone. Super royal 8vo, pp. 164, with illustrations. Price: 12s. 6d. net.

known, but it may be questioned whether some of the methods of extreme accuracy in localization here described are practicable in times of stress.

The principles which underlie wound excision—that all-important question—are admirably set forth by Sampson, and the directions both for the organization of the teams and the conduct of the operation are excellent. It is satisfactory to find attention drawn to the interosseous region of the leg as one deservedly of ill-repute. In the after-treatment of the excised wound the pros and cons of the several generally accepted methods are discussed. The local treatment of the frankly infected wound is well handled by Seymour Barling. At no stage is there more need for a mature judgement and conservatism. A strong plea is made for the abolition of all unnecessary dressings, with the disturbance that is inseparable from them.

Those seeking help and guidance in the field of chemotherapy will welcome the clear directions for treatment laid down by Thrower. He discusses the rationale of chemotherapy and the principles governing administration. A definite preference for oral or parenteral administration as opposed to local or depot treatment of wounds is evident, and it is interesting to find that this authority does not labour the necessity for dietetic restrictions.

The chapters in Section II, dealing with special considerations, of outstanding interest and importance, are those devoted to gas gangrene and tetanus. Less vital, perhaps, but nevertheless meriting close attention, are the subjects of delayed primary suture and secondary suture and skin grafting in wounds involving skin loss. This last chapter, by McIndoe, describes the clinical features of healthy and unhealthy granulating areas and the measures to be adopted to secure the former. The difficulty of conditioning the raw areas resulting from burns of the third degree is so considerable that the suggestion is made that in suitable cases immediate excision and grafting may be the procedure of election. The subject is unfinished in this Part I, of which the last page will be read with as great interest as the first, and with a growing admiration of the supreme detachment which enables British surgeons so successfully to undertake such a work under prevailing conditions.

MOSQUITO CONTROL.

WILLIAM B. HERMS and Harold F. Gray have been working on mosquito abatement, chiefly in California, for some thirty years; accordingly, their book "Mosquito Control" is packed with practical details and deals thoroughly with the economic as well as the technical aspects of anti-mosquito work.[1] Their principles are sound. They never lose sight of the essential point, which is to minimize the production of mosquitoes in the breeding grounds rather than to combat adults after they have hatched. Hence they insist on a thorough preliminary survey before going into action. Obviously it would not be possible to give detailed descriptions of the breeding habits of large numbers of species, and very wisely the authors confine themselves almost entirely to examples culled from their own experience; they explain their methods of approaching various problems so clearly that any reader could grasp the fundamentals and modify them to suit his own set of conditions. In addition there are three very useful appendices outlining the breeding habits of certain of the more important species and the methods of dealing with them. Bound up with the preliminary survey is the assessment of expenditure; there are numerous examples of estimating the relative costs of alternative methods, of determining the probable benefits in relation to outlay, and of calculating correctly equipment, material, and labour costs.

Biological control, by providing shade or opening up breeding water to sunlight, by increasing or decreasing the salinity of marshes, by controlled reflooding, and by using predatory fish, is described; species sanitation, with the use of some of these methods, is the quickest and cheapest measure when disease vectors present the main problem; but wherever possible, if the advantages to be gained will justify the cost, as they usually do when one is dealing with pest mosquitoes in settled communities, the authors prefer to eliminate breeding grounds as far as possible by primary measures (draining and reclamation) and to reserve secondary measures (oiling and Paris green dusting) for the untreated residue. The chapters on draining are very full, dealing with the merits of different types of equipment and giving instructions for laying out ditches. But the beginner who accepts the advice to equip himself with a few stakes, 500 feet of cord, and a carpenter's level, and to lay out his own ditches, will probably spend much time and money proving that water will not run uphill. Only those with special training or much hard-bought experience should risk dispensing with a surveyor's help. Modifications for urban and rural communities, streams, fresh-water marshes, and salt-water marshes are fully discussed. There are two chapters on oils and larvicides, with illuminating cost analyses. Exception must be taken to the statement that kerosene placed in rainwater tanks causes no unpleasant taste.

The importance and the difficulty of educating the public, the various ways of securing public cooperation, and the legislative background which will give to an abatement project the greatest efficiency with the least political interference, are well discussed, and, despite their typically American setting they are so presented that they can serve as models for any set of circumstances.

The style is crisp and concise, and the subject matter is well presented, with a wealth of useful hints and details. Production is excellent, with a minimum of errors. The illustrations are well done. This is an extremely readable and useful book, of the greatest value to public health authorities and malarialogists.

[1] "Mosquito Control, Practical Methods for Abatement of Disease Vectors and Pests", by W. B. Herms, Sc.D., and H. F. Gray, Dr.P.H.; 1940. London: Oxford University Press. Super royal 8vo, pp. 329, with illustrations. Price: 20s. net.

WAR WOUNDS AND INJURIES.

THE editors of the *Post-Graduate Medical Journal* have made themselves responsible for a collection of articles dealing with the management of war wounds and injuries.[1] As they state in the preface, the surgical attitude towards these problems must remain plastic, but in the present state of our knowledge the subject matter will furnish a useful starting point, particularly for those who are less familiar with the problems of traumatic surgery.

The subject of the first chapter is that of shock, the physiology, causation and treatment of which follow accepted teaching. In the choice of anæsthetic a distaste for spinal anæsthesia is implied, although the reader may be left in some little doubt as to its complete unsuitability for the shocked patient.

The treatment of gas gangrene is so essentially an urgent surgical problem that precedence might well have been given to a description of the appropriate surgical measures rather than to the general treatment of the patient.

Tense hæmatoma formation from wounding of a large vessel is rightly said to call for differentiation from the swelling of gas gangrene; but the failure to note the common sequence of the two conditions is an omission that should be rectified. A clearer distinction might be drawn between the cellulitic type of gas infection and the gangrene arising in devitalized muscle.

Considerable space is devoted to the treatment of penetrating wounds of the chest, of which an excellent account is given. Particularly good is that part dealing with the late effects of these injuries.

Sections dealing with intestinal wounds and those of the urinary tract are in the capable hands of C. P. G. Wakeley and Gordon-Taylor, both of whom write from a vast store of experience. Mitchiner contributes a section dealing with the treatment of wounds of the blood vessels—a rather thankless task in what is, under war conditions, a limited field. Mention is made of the possibility that the use of heparin may greatly increase the opportunities for reparative work. Useful advice is contained in the few pages allotted to Seymour Barling for the discussion of amputations, and McMurray speaks with authority upon ankylosis and other orthopædic problems. Injuries of the face and jaws, and those of peripheral nerves, are shortly dealt with by Cole and Platt respectively, but in both instances restrictions of space have proved a severe handicap. In fact the difficulties which all the distinguished contributors have experienced from this cause demands most sympathetic consideration.

[1] "War Wounds and Injuries", edited by E. Fletcher, M.A., M.B., M.R.C.P., and R. W. Raven, F.R.C.S., with a foreword by Lord Horder; based on articles in the "Post-Graduate Medical Journal"; 1940. London: Edward Arnold and Company. Demy 8vo, pp. 270, with illustrations. Price: 14s. net.

The Medical Journal of Australia

SATURDAY, MAY 17, 1941.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: Initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

COORDINATION OF MEDICAL SERVICES: THE PROFESSION AND THE PUBLIC.

In the course of a discussion in a recent issue of this journal on Australian doctors and the war it was explained that deputy chairmen had been appointed to the Central Medical Coordination Committee and to the Coordination Committees in the several States, that those who had been appointed were men in touch with medical practice, and that "more effective action might be taken in the future". Details were then given of the problem facing the Central Coordination Committee in regard to the supply of doctors for the defence forces and for the needs of the civil population. An appeal was made for offers of service by the younger members of the profession, and some indication was given of the steps that will have to be taken to find the medical officers who are needed for military duties within the Commonwealth. But coordination of medical services does not end when medical men and women have been appointed to certain posts, allotted to defined areas or told that a particular type of work will be required of them. Other considerations arise that call for a readjustment of ideas and perhaps some personal sacrifice or inconvenience; some of them concern the medical profession alone and others involve the general public.

When large numbers of medical practitioners relinquish civil practice to take up duty with the defence forces, practice among the civil population is immediately upset in all its branches—hospital practice, contract practice and private practice. This is obvious; but conditions are made doubly difficult by the distribution of the population. For instance, if there are six or eight practitioners in a district and one of them takes up military duty, the number of people whom the absentee would theoretically be serving, would, again theoretically, be distributed among "the public" of the remaining practitioners, and the increase in each man's work would not be so very great. But if one practitioner in a "two-man town" of, say, 5,000 inhabitants should be enrolled in the defence forces, the work of the man left at home would at once be doubled and he would almost certainly find the task beyond his powers. This is one kind of problem that the Coordination Committees will have to face; others of equal magnitude will help to make the work difficult. If mobilization should become necessary in the Commonwealth, withdrawal of doctors from civil practice will be much greater than it is likely to be in the present state of Australia's apparent immunity from attack—Major-General Maguire has told us that seven divisions in the field with corps and army troops would need medical units with a personnel of 1,260. At the same time the work of coordination in a state of mobilization would be simplified by the fact that the committees would be able to allot men to duty in certain areas and would not have to wait for them to indicate their willingness to go. It thus appears that in the present state of affairs the effectiveness as well as the smooth running of civil practice will depend in a large measure on the medical practitioners themselves, on the way in which they are content to work together and to bear their share of the increased burden. The point that we wish to make is that medical practitioners have at present a wonderful opportunity to forget quarrels, jealousies and imagined superiorities. The science of medicine is always greater than the student and its art than he who practises it. To study the science or to practise the art for the greater glory of self is to prostitute both, and it is self-seeking alone that sows discord, envy and hatred among those who should pursue common ideals. To strive for harmony in the practice of medicine today is necessary; if this is not done from worthy motives it will be found that circumstances will compel men to work in close association and that at best the relationship will be uncomfortable. From every point of view it is thus worth while to seek unity of effort. To win this war is surely the common aim of Australian doctors; they cannot hope to win unless they are united in every aspect of their work.

Turning the consider the public in relation to the present demands on civilian doctors, we find that a good deal may be said, though the average layman would probably deny that he could do anything about such a high-sounding business as coordination of medical practice. The general public will soon realize, if it has not already understood, that their choice of doctors in private practice is becoming restricted. In the abstract this will not matter much, but each individual will soon voice his disappointment when he discovers that the medical attendant on whom he has always relied is no longer available. He will ask himself what he is to do. Very few medical men who join the services are able to find a *locum tenens* to take care of their practices; but it is safe to assert that when a *locum tenens* is installed the average Australian citizen, who knows that his own doctor is serving the country, is not only a loyal but also a sporting person, and will, in common parlance "give the locum a run for his money". Whether this arrangement is successful then depends on the *locum tenens*. When one or two practitioners have left a district to serve with the forces and those remaining

are working at high pressure, there are certain things that all patients can do to ease their burden. To do the best for the patient, the general practitioner, like every other worker with hand or brain, must have a certain amount of leisure time and must have his rest at night as undisturbed as possible. In a general practice of average size this is difficult enough to obtain in peace-time; in the overloaded conditions of war it is much more difficult and often impossible. The general public must be asked to help in the following ways. In the first place, all unnecessary consultations with a doctor should be avoided; this is so obvious that little need be added about it. Even in private practice the medical man is sometimes visited or called when he is not really needed and in contract practice this is, of course, more likely to occur. In the second place the doctor should not be called at night if it appears that the patient can wait until the morning; the doctor may then be able to visit more than one patient at an outing, thus saving time and conserving his own strength and energy. Again, if the patient can visit the doctor's surgery, even by taking a conveyance, he should refrain from summoning the doctor to his bedside. By so doing he may make it possible for the doctor to give advice to one or two people who might otherwise have to do without it. Lastly, when the medical practitioners of a district ask, as most of them do, that messages be left before a certain hour in the forenoon, patients will make the conduct of a practice easier if they meticulously comply with the request. Perhaps one more point may be mentioned. We have insisted that medical practitioners, like other workers, should have occasional "rest pauses", periods away from the cares and worries of practice. In the present circumstances it will be impossible for *locum tenentes* to be found whenever they are needed and the other practitioners will have to burden themselves still further when each in turn has his spell of leisure. Patients can make the running of practices easier if they will accept the services of the practitioner on duty and assist him in the ways already set out, just as they would their own regular attendant.

We have shown that both medical practitioners and patients can help to make the crowded medical practice of today effective, the former by collaboration and dove-tailing of their several activities, the latter by falling in with certain suggestions that will impose no hardship on them. The conveyance of this message to the profession can be left to such agencies as this journal and the Branches of the British Medical Association, to which the vast majority of Australian practitioners belong. It is not quite so easy to reach the general public. There are several approaches by which the attempt may be made, and we would again urge that whenever such an attempt is made it should be clearly and emphatically stated that compliance with the suggestions is one way in which sick people can help to win the war. To begin with, the Central Coordination Committee might appeal to newspapers to give prominence to this matter; and country Press associations should not be forgotten when this is done. Again, it should be possible to persuade the Australian Broadcasting Commission that this matter is of national importance and that short appeals ought to be made over the national network at suitable hours in the evening when many persons are listening. Perhaps the best results would follow a ministerial statement and we would therefore urge the Central Coordination Committee to prevail upon the appropriate minister to take up this matter officially and make a statement about it.

Current Comment.

ISO-IMMUNIZATION IN PREGNANCY.

A NUMBER of transfusion accidents in pregnancy have been recorded in medical literature. In some of these the donor, frequently the husband, was in the same group as the patient. Atypical agglutinins have been demonstrated in the blood of the patient in some instances. Philip Levine, Eugene M. Katzin and Lyman Burnham[1] state that analysis of a series of 12 cases in which atypical agglutinins could be demonstrated revealed the significant fact that the patients presented obstetric histories characterized by a number of complications such as toxæmia, macerated fœtus, repeated abortions, miscarriages or still-births. More recently, five additional patients with atypical agglutinins were observed, three of whom gave birth to infants suffering from *erythroblastosis fœtalis*. Serological tests for syphilis gave no reaction in each instance. The authors believe it probable that there is a connexion between the occurrence of these complications and the presence of immune agglutinins in the mother. This relationship lends itself readily to form a theoretical basis for the ætiology of at least some cases of *erythroblastosis fœtalis*. The idea of an antigen-antibody reaction as a basis for the ætiology of *erythroblastosis fœtalis* has been mentioned by Ruth Darrow and by Ottenberg. It is, of course, only one of many theories advanced to account for this curious and tragic condition of familial fœtal deaths. The observations recorded by Levine and his associates are not conclusive, but the association of *erythroblastosis fœtalis* with the presence of atypical agglutinins in the mother's blood is certainly of very great interest. The authors state that the agglutinins contained by this serum are analogous to the anti-Rh agglutinin of Landsteiner and Wiener. (Rh is an antigen present in the red blood cells of *Macacus rhesus* and in about 85% of human beings.) An addendum contains a note of the finding of anti-Rh agglutinins in the blood of three additional patients who gave birth to infants suffering from *erythroblastosis fœtalis*. In three other cases atypical agglutinins could not be found, although the tests were made soon after delivery. Of course, other blood factors may be involved. Again, it is possible that *erythroblastosis fœtalis* may be a symptom complex rather than a single disease, and may have a varied ætiology. Levine and his associates express the hope that methods will soon be found for the preparation of potent immune anti-Rh sera in rabbits or other animals.

TOXOPLASMOSIS.

TOXOPLASMA is a genus of protozoan parasites which has been recognized for some time as the cause of disease in rodents. Our knowledge of human infection with this protozoan is in its infancy. The organism has recently been shown to be the cause of a peculiar type of meningo-encephalitis in new-born infants. It is suggested that the infection is a prenatal one, the mother's infection being latent or subclinical. Henry Pinkerton and Richard Henderson describe the occurrence, in St. Louis, of two fatal cases of an acute febrile exanthematous disease in adults.[2] Intracellular toxoplasma organisms were found

[1] *The Journal of the American Medical Association*, March 1, 1941.

[2] *The Journal of the American Medical Association*, March 1, 1941.

in the tissues of both these patients, in such numbers as to leave no doubt as to their significance. The disease was readily transmitted to guinea-pigs by inoculation of blood taken from one of the patients during life and to mice by the intracranial inoculation of autopsy material from the same patient. In the case of the other patient, guinea-pigs injected intraperitoneally with five cubic centimetres of blood developed febrile illnesses which were not completely investigated.

The clinical features in both cases were those of an acute febrile exanthematous disease with atypical pulmonary involvement. Each patient showed a maculo-papular rash covering the entire body, except for the scalp, the palms of the hands and the soles of the feet. The duration of the fever was apparently six days in the first and eighteen days in the second case, but the presence or absence of slight fever during the prodromal period is an unknown factor in each instance. Pulmonary involvement occurred in both patients and death appeared to be due to interference with respiratory function. The authors draw attention to the resemblance of this condition to the rickettsial diseases, particularly to Rocky Mountain spotted fever. In regard to the Weil-Felix reaction in the first case, agglutination tests failed with *Bacillus proteus* X2, but positive results were obtained with X19 in a dilution of 1 in 160. In the second patient, four days before death, agglutination tests with *Bacillus proteus* X2 and *Bacillus proteus* X19 failed to give reactions at all dilutions higher than 1 in 20. In each case there was a definite history of the removal of engorged ticks a few days before the onset of the illness. The authors suggest that animal inoculation should be performed more frequently in isolated cases and in small outbreaks of febrile illnesses. They also observe that the presence of toxoplasma-laden macrophages in alveoli and bronchioles indicates that the diagnosis might be made from Giemsa-stained films of the sputum.

In the same issue of the journal Albert R. Sabin describes the occurrence of atypical encephalitis in two boys, aged six and eight years respectively. Definite evidence of the presence of the protozoan parasite toxoplasma was obtained in one and suggestive evidence in the other. The outstanding clinical features in both patients were generalized convulsions, disorientation, fever and pleocytosis without signs of meningeal irritation or signs of involvement of the cranial nerves. One patient died thirty days after the onset of his illness; the other recovered completely on the tenth day. There was no history of tick bite.

Such reports as these suggest that clinicians should be on the alert in regard to febrile illnesses of unknown origin. It would be interesting to know how many serious, even fatal, febrile illnesses occur each year without satisfactory diagnosis. In particular, any illness resembling the rickettsial diseases should be very fully investigated, for it may indicate an underground epidemic in rats or other animals. Rodents are the natural reservoir of the rickettsial diseases, and although hitherto these have occurred only in mild forms in Australia, it is held that their mortality may vary from 1% to 70%.

POST-OPERATIVE GRANULOMA CAUSED BY MAGNESIUM SILICATE.

IN 1912 R. A. Lambert showed that when lycopodium was used as an irritant giant cells were formed in lymphocytic cultures. Apparently some years elapsed before the effect of lycopodium was recognized clinically. William Antopol was one of the first to draw attention to the subject.[1] In 1933 he described six cases of what he called lycopodium granuloma. He described the granulomatous lesion as a reaction to the spores of lycopodium, and stated that it was composed of granulation tissue, usually in the form of nodules, and contained epithelioid cells and giant cells of the foreign body as well as the Langhans type. There were usually, he added, extensive areas of fibrosis and some areas of necrosis, and the lycopodium spores might be seen within the granulation tissue and also within the giant cells themselves. To show that a piece of body tissue might become contaminated with lycopodium spores during surgical removal, he intentionally handled with gloves that had been powdered with spores a freshly removed specimen in a case of acute appendicitis. After the specimen had been dehydrated, embedded, sectioned and stained, microscopic examination showed that many of the spores had become completely embedded in the tissue. This in Antopol's view was likely to lead to errors in diagnosis. At the same time he expressed the opinion that crystals of magnesium silicate or talc might possibly produce similar lesions. This opinion was shown to be correct in 1937, when Robert Fienberg reported two cases of granuloma that had been caused by talc and three in which crystals morphologically similar to talc crystals were present.[1] In an experimental investigation he also produced in mice lesions similar to those described in his cases. His final conclusion was that the indiscriminate use of talcum powder in the operating theatre might produce granulomatous lesions.

Interest in this subject has recently been aroused again by Edward J. McCormick and Thomas L. Ramsey, who describe two cases of granulomatous inflammation following operation.[2] In each instance tissue was removed at a second operation and on examination granulomatous tissue containing magnesium silicate crystals was found. There is no need to follow the details of the two case histories; many readers who do so will doubt whether McCormick and Ramsey are justified in the view that it was the granulomatous tissue which made the second operation necessary in each instance. This is, however, not of vital importance. The chief point is that magnesium silicate was found. Unfortunately McCormick and Ramsey do not discuss the extent to which powdered gloves were used by the surgeon in the first operation in each instance. We are left to presume that powdered gloves were worn. In spite of this incompleteness the origin of the granulomatous tissue in these cases appears to be clear. It is only when magnesium silicate crystals can be demonstrated in giant cells that they can be regarded as the cause of the granuloma. The practical point that emerges is that the excessive and indiscriminate use of powder on gloves or hands is to be avoided. An excess of talc can always be removed by thorough washing. We must also remember that the use of rectal or vaginal suppositories covered with powder is not without danger.

[1] *Archives of Pathology*, Volume XVI, 1933, page 326.

NATIONAL EMERGENCY SERVICES OF NEW SOUTH WALES.

A BROCHURE entitled "First Aid Services" has been compiled by the Medical Services Committee of National Emergency Services of New South Wales and issued by the authority of the Minister in charge. The brochure is divided into three parts. The first is the introduction which gives a general idea of the whole of first-aid organization. In the second part the establishment is set out, and the third comprises the standing orders of the establishment. The third part has two sections, one dealing with the headquarters establishment and the other with the area establishment. This is an important publication and should be noted by all who are likely to be connected with national emergency services. The Medical Services Committee has attempted to place the first-aid services on a basis of constituted authority so that every member of either the medical or first-aid personnel will know what his or her duties are.

[1] *Archives of Pathology*, Volume XXIV, 1937, page 36.

[2] *The Journal of the American Medical Association*, March 1, 1941.

Abstracts from Medical Literature.

PHYSIOLOGY.

The Pressor Substance in Ischæmic Kidney Blood.

M. FRIEDMAN, A. SELZER AND J. J. SAMPSON (*The American Journal of Physiology*, January, 1941) describe experiments seeking to compare the effects of ischæmic kidney blood with those of the pressor substances already reported. The presence of a pressor substance in the venous blood of an isolated perfused kidney and in the intact kidney of the dog has been demonstrated. This substance was detected in the blood leaving the kidney within fifteen minutes after the initiation of partial ischæmia. Its pressor quality at this time was as strong as that found in blood obtained after longer periods of partial ischæmia. This indicates that the production of this substance is not dependent upon progressive autolysis or destruction of the kidney. The ischæmic kidney blood was found to have a pressor effect which differed from renin in that its action was immediate and of moderate duration. Animals made tachyphylactic to the introduction of kidney blood still reacted to the injection of renin. The substance was destroyed by the action of heat upon the plasma containing it. It was also ineffective when injected into a dog via the renal artery supplying a normal kidney. The substance could not be removed from ischæmic blood plasma by prolonged dialysis. From its physiological behaviour it is deduced that this ischæmic pressor substance is not identical with either renin or angiotonin ("hypertensin").

The Influence of Morphine on Transportation in the Colon of the Dog.

R. D. TEMPLETON AND H. F. ADLER (*The American Journal of Physiology*, December, 1940), using a balloon as a bolus, have determined the relationship of transportation to the segments of the colon, periods of activity, sustained tonicity and even to the different phases of individual contractions. In an earlier communication transportation was found to be related to the systolic phase of certain types of contraction and was dependent upon the character of the contraction rather than upon the total quantity of activity. Following the administration of moderate doses of morphine to unanæsthetized dogs, there was an immediate augmentation followed by a retardation in the rate of transportation of a bolus in the colon. The effect of morphine on the various types of contraction is used to explain the well-known clinical observation that the distal portion of the colon is more responsible for constipation than is the proximal.

Calcium in the Coagulation of the Blood.

ARMAND J. QUICK (*The American Journal of Physiology*, December, 1940) records the effect of sodium oxalate on the clotting times of fowl blood. It is generally accepted that thrombin is formed by the interaction of prothrombin, thromboplastin and calcium. The author has already shown that the prothrombin is relatively constant for any one species. The thromboplastin was made constant by its addition in excess, as experiment showed that a point was soon reached at which the time of coagulation was unaffected by further additions of thromboplastin. The speed at which blood coagulates is determined by the rate at which thromboplastin is liberated. Factors influencing this rate are species, temperature and surface of the container. The more the liberation of thromboplastin is inhibited, the less the amounts of decalcifying agents, such as oxalate or citrate, necessary to prevent coagulation. Approximately three times the calculated amount of oxalate necessary to precipitate the calcium is required to prevent the clotting of fowl and human blood. The anticoagulating action of sodium oxalate is not immediate; the greater the excess of oxalate, the faster coagulation is inhibited. Oxalated plasma containing excess thromboplastin will on recalcification clot in approximately the same time as is observed for unoxalated plasma mixed with excess thromboplastin. The author postulates the presence of calcium in prothrombin, as Martin has already suggested, but differs from that author in suggesting that prothrombin is directly converted to thrombin by means of thromboplastin without the participation of ionized calcium.

Pepsin Inhibitor.

ROGER M. HERRIOTT (*The Journal of General Physiology*, January, 1941) describes the isolation, crystallization and properties of pepsin inhibitor. When a solution of pepsinogen is acidified, pepsin and certain polypeptides are produced, one of which has a powerful inhibiting action on pepsin. This substance has been isolated and examined. It is a polypeptide with a molecular weight about 5,000 and an iso-electric point at pH 3·7. It contains arginine and tyrosine, but no tryptophane, and has basic groups in its structure. The inhibitor is very specific and does not act on other proteolytic or milk-clotting enzymes. At a pH of 3·5 it is destroyed by pepsin. The inhibitor obtained from the pig inhibits bovine pepsin, but not fowl pepsin, whereas fowl inhibitor was active against both pig and bovine pepsin.

The Effect of Variations in the Concentration of Oxygen and Glucose on Dark Adaptation.

R. A. MCFARLAND AND W. H. FORBES (*The Journal of General Physiology*, September, 1940) state that the functioning of the central nervous system depends upon a continuous and adequate supply of oxygen and glucose. When the concentration of either of these substances in the blood is lowered to one-half of its usual level, there is a significant impairment in cerebral function. At one-third to one-fourth of the normal level the individual lapses into coma. In this study the authors have analysed the effects of variations in the concentrations of oxygen and of blood sugar on light sensitivity. The experiments were carried out in an air-conditioned light-proof chamber, where the concentrations of oxygen could be changed by dilution with nitrogen or by the inhalation of oxygen from a cylinder. The blood sugar was lowered by the injection of insulin or raised by the ingestion of glucose. Dark adaptation curves were plotted against time in normal air and compared with those obtained during inhalation of lowered concentrations of oxygen. A decrease in sensitivity was observed with lowered oxygen tensions. Both the rod and cone portions of the curve were influenced in a similar way. When oxygen was then inhaled the thresholds returned to normal within a period of two or three minutes. In some subjects with a poor tolerance for low oxygen pressures the impairment was greatest. Both the inter-individual and intra-individual variability in thresholds increased significantly at the highest altitude. In experiments in which the blood sugar was raised by the ingestion of glucose in normal air, no significant changes were observed except when the blood sugar was rapidly falling toward the end of the glucose tolerance tests. However, when glucose was ingested at the end of an experiment with low oxygen pressures the effects of the anoxia were largely counteracted within six to eight minutes. The threshold was raised as soon as the injection of insulin produced a fall in the blood sugar. When the subjects then inhaled oxygen the thresholds were lowered, only to rise again within one or two minutes when the subject breathed normal air. Finally, when the blood sugar was raised by the taking of glucose, the threshold fell to the original value or below it. The combined effect of low oxygen and low blood sugar content was greater than that of a similar degree of anoxia or hypoglycæmia alone. After a normal breakfast the sensitivity of most subjects was increased. The experiments lend support to the hypothesis that both anoxia and hypoglycæmia produce their effects on light sensitivity in essentially the same way, namely, by slowing oxidative processes; consequently the effects of anoxia may be ameliorated by the giving of glucose and those of hypoglycæmia by the administration of oxygen. The effects are attributed directly to the effects on the nervous tissue of the visual mechanism and the brain rather than on the photochemical processes of the retina.

The Dependence of the Carbohydrate Fat and Protein Appetite of Rats on the Various Components of the Vitamin B Complex.

C. P. RICHTER AND C. D. HAWKES (*The American Journal of Physiology*, January, 1941) describe some results obtained by feeding rats on the self-selection plan. It had been previously shown that rats grew and thrived on a diet which they themselves selected entirely from an assortment of purified substances. On these self-selection diets the rats grew and reproduced as well as on the standard McCollum diet, while consuming 15% to 40% less weight of food. A control group of young adult rats was given access to a self-selection diet of sucrose, olive oil, casein, five mineral solutions, cod liver oil and dried baker's yeast. The rats gained weight at a normal rate, showed regular four to five day œstrous cycles and normal endocrine glands. The average diet consisted of carbohydrate 55·8%, fat 18·4%, and protein 25·8%. Another group were given access to the same substance except the yeast, so lacking all of the *B* vitamins. They lost weight at once, lost their sex cycle in fourteen days, and after forty days atrophy of the endocrine glands was noted. Their appetite showed marked changes. They

ate little carbohydrate (24·9%), almost no protein (7·5%) and subsisted largely on fat (67·6%). Several other groups had access to the same basic self-selection diet without yeast, but with thiamin chloride, riboflavin, nicotinic acid and vitamin B_6, offered singly or in various combinations. The rats showed an active appetite for each of the vitamins. The ingestion of thiamin chloride particularly stimulated the carbohydrate appetite, riboflavin seemed to have a stimulating effect on the fat appetite; but no one vitamin had an exclusive effect on the appetite for any of the three main foodstuffs. The ingestion of the four vitamins markedly increased the appetite for calcium lactate and sodium phosphate. It would appear that by regulation of the vitamin *B* components of the diet the appetite for carbohydrate, fat and protein may be increased or diminished almost at will.

BIOLOGICAL CHEMISTRY.

Nutritional Cytopenia in Monkeys.

P. L. DAY, W. C. LANGSTON, W. J. DARBY, J. G. WAHLIN AND V. MIMS (*The Journal of Experimental Medicine*, October, 1940) have reported experiments on young rhesus monkeys, which were given a diet essentially the same as the Goldberger black tongue producing diet, supplemented in various ways. Those monkeys receiving the unsupplemented diet developed a syndrome characterized by leucopenia, anæmia, gingivitis, diarrhœa and death. When the diet was supplemented with ascorbic acid and liver extract normal growth and development occurred and a normal blood picture was maintained. Feeding of a crude liver extract to an animal with profound anæmia and leucopenia was followed by a dramatic reticulocyte response and ultimate recovery. The ash of liver extract failed to maintain a normal blood picture or to prolong life. The addition to the diet of ascorbic acid, thiamin chloride, nicotinic acid (or amide) and riboflavin failed to prevent leucopenia, gingivitis, diarrhœa and death. The combination of nicotinic acid and riboflavin, however, appeared to have a definite erythropoietic effect. *Shigella paradysenteriæ* was isolated from the stools of several affected animals, but the relation between the deficiency, the infection and the blood picture was not clarified. It was evident that the Goldberger diet, even when supplemented with nicotinic acid, riboflavin, thiamin and ascorbic acid, was inadequate for maintenance of health in the young monkey. The authors conclude that the diet is lacking in a substance or substances which they have termed vitamin *M*.

Hæmoglobin Excretion.

S. DE NAVASQUEZ (*The Journal of Pathology and Bacteriology*, November, 1940) studied the history of three patients who died after blood transfusion and who suffered from oliguria, hæmoglobinuria and jaundice. In two cases the urine was alkaline, but this did not prevent anuria or subsequent death. There was no histological evidence of obstruction of the kidneys. The excretion of hæmoglobin in a man with paroxysmal hæmoglobinuria, whose urine was rendered acid, was investigated and no impairment of renal function was observed. Repeated injections of large doses of hæmoglobin solution in rabbits with both acid and alkaline urine showed a higher excretion rate in the former and a greater retention of iron in the kidneys of the latter. The renal function, judged by the phenol red excretion test, was normal, though the blood urea content was increased in both. In man, hæmoglobinuria did not appear to damage the kidneys when the pH of the urine was between 5·5 and 6·3 and when 3% to 10% of the total red cell volume was rapidly hæmolysed.

Serum Antigens in Syphilis.

HERMAN BROWN AND JOHN A. KOLMER (*The Journal of Biological Chemistry*, February, 1941) have attempted to determine the active antigenic principle in alcoholic beef heart extracts used for the complement fixation and flocculation tests for syphilis. The procedure consisted of an analysis of the precipitate formed in the Kahn flocculation reaction. The precipitate consisted of cholesterol, reagin protein and mixed phosphatides. The latter were separated into an ether insoluble, alcohol soluble diaminophosphatide, which was inactive, and two other fractions, both of which were equally potent per unit weight and compared well with the original Kahn antigen. Although the two antigenically active fractions had the solubility characteristics of a cephalin and a lecithin respectively, the analytical values indicated that they were mixtures, each containing about 40% of a non-nitrogenous, phosphorus-containing substance. The evidence indicated that the antigenic activity could not be a property of either lecithin or cephalin, but was due to an unknown substance adsorbed in equal proportions by both.

Determination of Blood Carbon Monoxide.

F. J. W. ROUGHTON (*The Journal of Biological Chemistry*, February, 1941) has described a new method for the estimation of carbon monoxide in blood. The principle of the method is to bind the oxygen and carbon dioxide in the blood solutions with an alkaline glycinate-hyposulphite mixture and at the same time to liberate the nitrogen into the gas phase. The nitrogen is quantitatively ejected and the carbon monoxide is subsequently liberated by shaking with neutral ferricyanide solution. The technique is adapted to both the Van Slyke-Neill apparatus and the Barcroft differential manometer. The two apparatuses give extremely concordant results both with each other and with alternative methods of estimation. In the Van Slyke apparatus the method gives a high order of precision. With the Barcroft apparatus the results are not quite so accurate, but the technique is especially convenient when large numbers of estimations are required.

Phosphate Excretion with Vitamin D and Parathormone.

HAROLD E. HARRISON AND HELEN C. HARRISON (*Journal of Clinical Investigation*, January, 1941) have studied quantitatively the reabsorption of phosphate by the renal tubules in the dog, by means of the concurrent determinations of creatinine and phosphate clearances, following intravenous injection of phosphate salts. Under standard conditions there was a limiting maximal rate of reabsorption of phosphate by the tubules, and this did not vary when the concentration of phosphate in the plasma was elevated by administration of phosphate salts. The phosphate filtered through the glomeruli, which was in excess of the maximum that could be reabsorbed by the renal tubules, was excreted in the urine. The administration of vitamin *D* to young dogs, which had been fed a rhachitogenic diet, produced an increase in the maximal rate of reabsorption of phosphate, thus increasing the concentration of inorganic phosphate in the plasma at equilibrium. This effect was demonstrable twenty-four hours after adequate amounts of vitamin *D* were given, and was considered to be an important factor in vitamin *D* antirhachitic function. The reverse effect was obtained with parathyreoid extract. Following injections of the extract, there was a considerable decrease in the rate of reabsorption of phosphate by the renal tubules, and a consequent reduction in the concentration of phosphate in the plasma.

Action of Detergents on Metabolism of Bacteria.

Z. BAKER, R. W. HARRISON AND B. F. MILLER (*The Journal of Experimental Medicine*, February, 1941) have studied the effects of synthetic detergents and wetting agents on the respiration and glycolysis of Gram-positive and Gram-negative organisms. All the cationic detergents studied were effective inhibitors of bacterial metabolism at a concentration of 1 in 3,000, and several were equally active at 1 in 30,000. The anionic detergents were generally less effective. Gram-positive and Gram-negative organisms were equally sensitive to the action of cationic detergents; in contrast, the anionic detergents selectively inhibited the metabolism of Gram-positive organisms. Inhibitory action was markedly affected by the pH value; cationic compounds were most effective in the alkaline range, the anionic compounds in the acid range. Certain detergents stimulated bacterial metabolism at concentrations lower than the inhibiting values; this effect was found more frequently among the anionic detergents.

Identity of Hyaluronidase and Spreading Factor.

E. CHAIN AND E. S. DUTHIE (*The British Journal of Experimental Pathology*, December, 1940) have presented evidence for the identity of spreading factor with the enzyme hyaluronidase. This enzyme acts on the polysaccharide hyaluronic acid, which is responsible for the high viscosity of synovial fluid and vitreous humour. The enzyme hydrolyses hyaluronic acid with the liberation of N-acetylglucosamine and glucuronic acids. The high viscosity of hyaluronic acid is quickly reduced to that of water. Hyaluronidase was found in all sources of spreading factor. Testis was the only mammalian organ in which the enzyme was found. A substance closely resembling hyaluronic acid was isolated from the skin of rabbits and from the sexual skin of monkeys during the œstrous phase. Salivary, gastric and duodenal mucin and mucin of the uterine cervix were not attacked by hyaluronidase. Spreading activity and hyaluronidase content were studied in testis, leech, bee and snake venom and in certain bacterial filtrates.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on April 17, 1941, at the Royal Alexandra Hospital for Children, Sydney. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff of the hospital.

Sclerema.

DR. L. A. DEY showed a female patient, aged nine days, who had been admitted to hospital on March 21, 1941, suffering from pyrexia and masses in the superficial tissues which had been present for three days.

Examination revealed a fairly well nourished baby with discrete indurated areas in both cheeks, arms, legs and buttocks. The umbilicus was not healed.

By March 28 the condition of the indurated areas was much the same as before. The umbilicus was very dirty and there was a profuse yellow discharge. On April 9 the lumps were not so large as before and the child was gaining in weight. The umbilicus was clean. An X-ray examination of the soft tissues and long bones revealed no abnormality.

Dr. Dey said that the condition conformed to the English type, sometimes described as pseudo-sclerema, the typical distribution of the affected areas being in the cheeks, buttocks and thighs.

Lymphatic Leuchæmia.

Dr. Dey then showed a male patient, aged three years, who had first been admitted to hospital on January 24, 1941, with a history of not being well for one week; he had been feverish and "off colour".

When the child was examined the liver was palpable, but the spleen was not. Occipital, cervical and inguinal glands were palpable. A blood count made on January 28 revealed that the erythrocytes numbered 3,800,000 and the leucocytes 5,000 per cubic millimetre; the hæmoglobin value was 64%. Of the leucocytes, 16% were neutrophile cells, 78% were lymphocytes and 3% were monocytes; no eosinophile cells were seen. There was no alteration in the blood picture until February 10, when the erythrocytes numbered 3,400,000 and the leucocytes 11,100 per cubic millimetre; the hæmoglobin value was 50%. Of the leucocytes, 29% were neutrophile cells, 68% were lymphocytes and 3% were eosinophile cells. Numerous lymphatic smears were seen. A further blood count on April 15 gave the following information: the erythrocytes numbered 2,500,000 and the leucocytes 10,500 per cubic millimetre, and the hæmoglobin value was 42%. Of the leucocytes, 6% were neutrophile cells, 91% were lymphocytes, 2% were myelocytes and 1% were blast cells; 52,300 thrombocytes were present per cubic millimetre.

Dr. Dey said that the first blood counts suggested a neutropenia rather than a leuchæmia; but subsequent counts revealed immature cells, and the child's general appearance at the time of the meeting suggested that he was suffering from leuchæmia.

Myeloid Leuchæmia.

Dr. Dey then showed a female patient, aged nine years, who had been admitted to hospital on April 9, 1941. She had previously had her tonsils and adenoids removed, and had suffered from pertussis, chicken-pox and measles. She had been "off colour" for several months, and complained of headache and giddiness; ten days prior to her admission to hospital she had had abdominal pain, and she was pale and was losing weight. The bowels were well open. No vomiting, cough or urinary symptoms were present.

On examination it was found that the spleen extended from the left costal region across to the right iliac fossa, occupying nearly the whole abdomen. The liver was not palpably enlarged. The splenic notch was at the level of the umbilicus. Slight enlargement of lymph glands was present at all areas. No abnormality was detected in the heart, chest or fauces. A blood count gave the following information: the erythrocytes numbered 2,610,000 and the leucocytes 864,000 (approximately) per cubic millimetre; the hæmoglobin value was 38% (Sahli), or 6·5 grammes per 100 cubic millimetres, and the colour index was 0·73. Of the leucocytes, 38% were polymorphonuclear cells, 6% were lymphocytes, 12% were metamyelocytes and 44% were myelocytes, and no monocytes or eosinophile cells were seen. The platelets numbered 464,000 per cubic millimetre. An extreme degree of myeloid leuchæmia was present.

Dr. Dey said that this patient was shown on account of the very large spleen; it extended almost to the *symphysis pubis*. The disease was of the classical type, and the blood picture was typical of myeloid leuchæmia. This type of leuchæmia was not often seen in children.

Double Renal Pelvis and Ureter.

Dr. Dey's next patient was a female, aged four years, who had been well until eight weeks previously, when she had had a convulsive seizure and some diarrhœa. Ever since she had had intermittent pyrexia and diarrhœa. She had also had two convulsive seizures since the first.

On examination the child was seen to be pale and sallow, and the abdomen was soft. Resistance was encountered in the right lumbar region, but no definite tumour was palpable. The temperature was normal. A blood count revealed that the erythrocytes numbered 4,000,000 and the leucocytes 9,800 per cubic millimetre, and the hæmoglobin value was 70%. The blood urea content was 28 milligrammes *per centum* and the blood cholesterol content 170 milligrammes *per centum*. Microscopic examination of the urine revealed numerous leucocytes. An excretion pyelographic examination was made, but no calculus was detected. A double renal pelvis and ureter was present on the right side, and there was slight delay in excretion at the uretero-vesical orifice. No hydronephrosis was present on the left side. The upper calyx was somewhat large. "M & B 693" was given, one tablet three times a day for nine days, and two drachms of potassium citrate mixture were given every four hours.

Dr. Dey said that he showed this patient to impress on those present the desirability of systematic examination for a cause in cases of pyelitis. In any case of long-standing or recurrent pyelitis, in which there was no response to simple treatment, a urological investigation should be made.

Rheumatic Carditis.

DR. L. H. HUGHES showed a female patient, aged ten years, who had been admitted to hospital on May 10, 1940, with a history of headache of three years' duration; the attacks lasted for one or two days, and had recently been more frequent. There was no history of vomiting, shortness of breath or cough, and no urinary symptoms were present. The patient had had scarlet fever at the age of two years, measles, whooping cough and mumps. There was nothing of note in the family history.

On examination the child was found to have a regular pulse. The apex beat was palpable in the fifth intercostal space, three inches from the mid-line; it was forcible in character. There was a rushing systolic murmur at the mitral area, propagated into the axilla. No abnormality was detected in the lungs. A blood count gave the following information; the erythrocytes numbered 3,010,000 and the leucocytes 8,300 per cubic millimetre, and the hæmoglobin value was 68% (Sahli) or 11·6 grammes per 100 cubic millimetres. The blood sedimentation rate was 12 millimetres after the first hour and 20 millimetres after the second hour. The child was treated with salicylates and later with iron. She was kept at rest for three months, and during this period her tonsils were removed; pus was present in the crypts. She was discharged from hospital on August 10, 1940, to attend the rheumatic clinic. At the time of the meeting she was very well and was attending school; a systolic murmur was present at the apex.

Dr. Hughes remarked that the persistence of such a mitral systolic murmur was the most common sequel to an attack of acute rheumatism in childhood. It might be followed by mitral stenosis, but very often disappeared, leaving no clinical evidence of endocarditis. Another point of interest was the insidious onset; the child had never had a well-defined acute attack.

Dr. Hughes next showed a male patient, aged ten years, who had been admitted to hospital on October 5, 1940, with a history of a sore throat three weeks previously, followed by pain in the groins, arms and legs one week later. He was drowsy, delirious and feverish. The child was said to have had a slight similar attack two years previously. The only other illnesses from which he had suffered were measles and mumps.

On examination the child was found to have painful joints, but there was no obvious swelling. The tonsils were enlarged. The apex beat was palpable inside the nipple line. A systolic murmur was heard at the mitral area. A blood count revealed slight anæmia. The blood sedimentation rate was 40 millimetres after the first hour and 50 millimetres after the second hour. The child was treated with rest in bed and the administration of salicylates. He was kept in hospital for six weeks, at the end of which period the blood sedimentation rate was quite normal. At the time of the meeting the child's condition was such that he

became a little tired at times, and both systolic and diastolic murmurs were audible at the mitral area.

Dr. Hughes commented that it was often stated that the development of a diastolic mitral murmur in rheumatism indicated the presence of stenosis of the valve. This was not so. It was true that in many cases, as in that under discussion, the condition did progress to permanent mitral stenosis; but in many others the soft diastolic murmur disappeared, leaving no clinical evidence of valvular disease.

Dr. Hughes's third patient was a male, aged eleven years, who had been admitted to hospital on June 28, 1940, with a history of "heart and kidney trouble". He had also had measles, chicken-pox and whooping cough, and had had his tonsils and adenoids removed. There was nothing of note in the family history. He had been attending the rheumatic clinic.

On examination the boy was seen to be pale; his pulse was regular, and the apex beat was situated in the fifth intercostal space, four inches from the mid-line. There was a presystolic thrill at the apex, and a crescendo presystolic and diastolic murmur were present at the apex. A blood count revealed slight secondary anæmia. The blood sedimentation rate was five millimetres after the first hour and twelve millimetres after the second hour. He was sent to the "Smith Family" home, and since then he had been attending the hospital as an out-patient. At the time of the meeting the boy was having occasional vomiting attacks, and a presystolic murmur was present. He was of a nervous type and had a tendency to tachycardia. There was no question of the presence of mitral stenosis in this case. The rough crescendo presystolic murmur diagnostic of the lesion was already clearly audible. Such a lesion was not common in a patient of eleven years.

Familial Acholuric Jaundice.

The next patient shown by Dr. Hughes was a boy, aged seven years, who had been admitted to hospital on April 4, 1941. His mother, brother, grandmother and aunt all had increased red cell fragility, with or without intermittent jaundice. The patient had been in the hospital two years earlier suffering from severe anæmia; reticulocytosis and increased red cell fragility were present, but no jaundice.

With regard to the present illness, the child had become jaundiced four days before his admission to hospital; he had had no previous attacks of jaundice. Since the onset of the jaundice the child had been vomiting and refusing food and had been taking fluids only; he had been rather drowsy. The urine was normal in colour.

On examination the child was found to have pronounced jaundice, but was not otherwise distressed. The spleen was enlarged one inch below the costal margin, but was not tender. Tenderness and muscle guarding were present in the right hypochondrium; the liver was not palpable. No abnormality was detected in the heart and chest. The stools were pale, but not completely free of pigment. The tonsils were small and not inflamed.

A number of special investigations were carrried out. The fragility of the erythrocytes was determined; hæmolysis was found to begin in 0·56% saline solution and to be complete in 0·45% solution. The erythrocytes numbered 3,980,000 and the leucocytes 9,000 per cubic millimetre of blood, the hæmoglobin value was 60% and the colour index was 0·76. Platelets were numerous and reticulocytes numbered 7% of the erythrocytes. The urine appeared turbid and was very dark in colour; it was alkaline and contained a large quantity of bile and some urobilinogen. The Van den Bergh test produced a direct positive reaction.

By April 15 the jaundice was much less, the spleen was smaller and there was no tenderness in the right hypochondrium; but muscle guarding was still present.

Dr. Hughes remarked that there was no question that the child was suffering from familial acholuric jaundice; he exhibited the characteristic features—anæmia with reticulocytosis and increased fragility of erythrocytes, and splenomegaly. Jaundice had never been a sufficiently prominent feature of his illness to be noticed by his family, from whom it received perhaps the disregard of familiarity. This, his first experience of pronounced icterus, was almost certainly obstructive rather than hæmolytic in type. Such severe jaundice as the child had had was rarely seen in a chronic hæmolytic disease, and hæmolytic jaundice of such a degree was quite incompatible with an erythrocyte count of almost 4,000,000 per cubic millimetre, even though considerable regeneration was proceeding. The large amount of bilirubin in the urine and the pale stools were even more direct evidence. The direct positive reaction to the Van den Bergh test did not necessarily indicate that the jaundice was obstructive, though hæmolysis had to be very pronounced for such a reaction to be obtained. It seemed certain that as a result of the passage of excess bile pigment down the biliary channels over the last few years, these had become blocked by pigment débris or by pigment stones. When the present attack of jaundice became minimal, it was hoped that the child's parents would agree to splenectomy. At the same time a search would be made for stones in the biliary tract.

Thrombocytopenic Purpura.

Dr. Hughes's next patient was a girl, aged seven years, who had been admitted to hospital on January 26, 1941. The child had had no previous illnesses, and there was no family history of blood dyscrasia. The present illness had begun four weeks before her admission to the Royal Alexandra Hospital for Children, when she was admitted to the Temora Hospital with a blood dyscrasia simulating purpura; she was given a blood transfusion at that time.

On examination the child was seen to be in good general condition. She had had an epistaxis and her gums were bleeding; numerous petechial spots were present over her body, and there was a large bruise over the right iliac crest. No abnormality was detected in the abdomen, and the spleen was not enlarged. The heart and chest appeared normal.

On January 28 the erythrocytes numbered 3,390,000 and the leucocytes 8,000 per cubic millimetre, the hæmoglobin value was 60% and the colour index was 0·9; no platelets were seen. On February 6 the blood platelets numbered 15,900 per cubic millimetre. On February 12 the erythrocytes numbered 4,960,000 and the leucocytes 12,900 per cubic millimetre, the hæmoglobin value was 80% and the colour index was 0·82; platelets numbered 49,000 per cubic millimetre. On February 24 the blood platelets numbered 133,000 per cubic millimetre, on March 11 they numbered 36,300 per cubic millimetre, and on March 18 they numbered 29,100 per cubic millimetre. On March 21 a blood transfusion was given. On March 25 the erythrocytes numbered 4,210,000 and the leucocytes 9,900 per cubic millimetre, the hæmoglobin value was 82% and the colour index was 0·97; the blood platelets numbered 91,200 per cubic millimetre. Fresh bruises had been appearing and clearing up ever since the child's admission to hospital. Three teeth had been extracted, and only slight bleeding from the gums had occurred at the time of the extractions.

Dr. Hughes said that the child presented a typical picture of thrombocytopenic purpura. It was characteristic for the platelet count to vary as it had done in the case under discussion. The treatment was to wait till the platelet count was relatively high and the child was fairly free from purpuric lesions and then to perform splenectomy. The result to be expected would be great improvement in the child's condition and perhaps cure. Blood transfusion might help to prepare the child for operation. It was interesting that excessive hæmorrhage did not follow surgical procedures on these children, as was shown when the teeth were extracted. The bleeding from a large wound was stopped by clotting of the blood, which proceeded normally. The bleeding time, however, which was measured by means of a needle puncture made in the skin, was prolonged in these cases, for bleeding from such a small wound was stopped by the deposition of a platelet thrombus, and this could not occur efficiently in thrombocytopenia.

(To be continued.)

Naval, Military and Air Force.

APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 81 and 85, of April 23 and May 1, 1941.

PERMANENT NAVAL FORCES OF THE COMMONWEALTH (SEA-GOING FORCES).

Surgeon Lieutenant Lowen Alexander Hardy (Emergency List) is appointed for temporary service, dated 29th March, 1941.

AUSTRALIAN IMPERIAL FORCE.

AUSTRALIAN ARMY MEDICAL CORPS.

To be Captains.—Captains P. J. Kenny and N. H. Morgan, 10th July, 1940; D. L. Mercer, 1st July, 1940; J. F. Lipscomb and Honorary Captain J. M. Yeates, 10th July, 1940; and Captains E. E. Broadbent, 1st February, 1941; and E. M.

Cortis, 19th March, 1941; Frederick Guy Tuddenham, 1st March, 1941.

The notification respecting the appointment of David Floyd Mercer which appeared in Executive Minute No. 183/1940, promulgated in *Commonwealth Gazette*, No. 199, of 26th September, 1940, is withdrawn.

To be Captains.—Captains H. G. Prest and K. B. Brown and Honorary Captain J. A. Bassetti, 1st March, 1941.

To be Major (temporarily).—Captain S. L. Seymour, 3rd December, 1940.

Reinforcements.

To be Major.—Captain (Temporary Major) W. V. Russell, 1st March, 1941.

To be Captains.—Captains W. R. Gayton, C. J. Gibson, and D. L. G. Thomas, 1st March, 1941; J. K. Gardner, 1st February, 1941; and Honorary Captains A. A. Merritt, A. E. Lincoln, E. Clarke and J. L. Frew, 1st March, 1941.

AUSTRALIAN MILITARY FORCES.

AUSTRALIAN ARMY MEDICAL CORPS.

Northern Command.

First Military District.

Reserve of Officers.—To be Honorary Captains—Francis Baron Burnett, 4th March, 1941; Walter Monz, 6th March, 1941; and Gordon Kenneth Hawkins, 13th March, 1941.

Eighth Military District.

Honorary Captain D. Watson is appointed from the Reserve of Officers (A.A.M.C.), 1st Military District, and to be Captain (provisionally), 4th March, 1941.

Eastern Command.

Second Military District.

Honorary Captain J. A. Bassetti is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 28th February, 1941. The names Howard Hamilton Webber and H. H. Webber, notifications of which appeared in Executive Minutes No. 51/1940 and No. 187/1940, respectively, and were promulgated in *Commonwealth Gazettes*, No. 49 of 1940 and No. 199 of 1940, respectively, are amended to read Howard Mansfield Webber and H. M. Webber.

The resignation of Captain (provisionally) A. K. McIntyre of his commission is accepted, 13th February, 1941.

Reserve of Officers.—To be Honorary Captains—Robert Swinburn, 20th February, 1941; Brian Ramsden Schloeffel, 26th February, 1941; James Woolnough, 10th March, 1941; Kenneth Stewart Wallace, 11th March, 1941; Samuel Lackey, William Wilson Ingram, M.C., 12th March, 1941; Leslie Critchley Dunlop, Colin Leslie Bear, 14th March, 1941; and Henry Ross Macourt, 17th March, 1941.

Southern Command.

Third Military District.

Honorary Captain J. L. Frew is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), 28th February, 1941. The notification respecting Colonel J. A. H. Sherwin, V.D., which appeared in Executive Minute No. 37/1941, promulgated in *Commonwealth Gazette*, No. 31 of 1941, is amended to read "from the Retired List" instead of "from the Unattached List".

Honorary Captains A. E. Lincoln and C. F. H. Pyman are appointed from the Reserve of Officers (A.A.M.C.), and to be Captains (provisionally), 28th February, 1941, and 7th March, 1941, respectively. Captain (provisionally) I. H. Cowling is transferred to the Reserve of Officers (A.A.M.C.), 27th February, 1941. Lieutenant-Colonel Blaubaum is placed on the Retired List, 11th March, 1941. *To be Captains (provisionally)*—Frederick Guy Tuddenham, Herbert Nathan Silverman, Richard Douglas Smith, Thomas Buchanan Campbell Patrick, 4th March, 1941.

Reserve of Officers.—The resignation of Honorary Captain D. A. Carter of his commission is accepted, 22nd February, 1941. *To be Honorary Captains.*—Jean Littlejohn, Esme Vivienne Anderson, Thomas Galbraith, Victor Alexander Conlon, Glenn Neville Frost, John Bertram Gilchrist Muir, George Herbert Wells, 4th March, 1941, and Frederick Harold Moran, 12th March, 1941.

Fourth Military District.

Honorary Captains W. A. Russell and H. G. Prest are appointed from the Reserve of Officers (A.A.M.C.) and to be Captains (provisionally), 11th April, 1940, and 3rd September, 1940, respectively.

Reserve of Officers.—To be Honorary Captains—Philip Murdoch Wesslink and Philipp Jacob Alpers, 5th March, 1941.

Sixth Military District.

Pharmaceutical Services.—Honorary Lieutenant C. A. Robertson is appointed from the Reserve of Officers (A.A.M.C.), and to be Lieutenant (provisionally), 11th March, 1941.

Western Command.

Fifth Military District.

To be Captain (temporarily)—Lieutenant (provisionally) H. D. Fitch, 28th February, 1941.

Honorary Captain D. A. Quinlan is appointed from the Reserve of Officers (A.A.M.C.), and to be Captain (provisionally), 10th March, 1941.

Reserve of Officers.—To be Honorary Captains—Henry John Arnold Barnard, Carl William Albert Joseph Schlink, Harold Robert Elphick, Edward Wilford Arndt, William Rex Moloney, Gordon Victor Stanton, Thomas Morris, Archibald Frederick George Cornelius Christie, William Frederick Tomlinson, Donald Wallace Fleming, and John Denman Craddock, 14th March, 1941.

Seventh Military District.

To be Major (temporarily).—N75075 Captain W. T. J. Harris.

Correspondence.

THE FREEDOM OF THE MEDICAL PROFESSION.

SIR: The pre-war writings of Alexis Carrel, the fine words of Mr. Churchill and a recent article by Sir John Orr in *The British Medical Journal* should have, by now, made us realize that we of the medical profession will have a most wonderful opportunity of taking the lead in the formation of the brave new world that we all hope to see follow victory and peace. I say formation instead of reconstruction, as the latter implies the patching of a system that is outmoded. What we want is a new broader concept of medical service, more disciplined and coordinated than the haphazard way in which we work now.

For those of us who are engaged in some form of active service it is heartening to see the articles of Dr. S. Boyd and Dr. A. E. Brown (THE MEDICAL JOURNAL OF AUSTRALIA, March 8, 1941, page 285; March 15, 1941, page 315) and to realize that there are such ideas afoot in our country and that there are some men with the courage to give them utterance. For we are as in a jungle, with our bodies and minds occupied in hacking through it successfully; but that does not prevent us from looking forward to and imagining the vista that we hope to reach. And will not that vista be better if it is already occupied by a plan that has sufficient breadth and foresight, one that has been born of medical minds for the communal benefit, and for the advancement of the profession, rather than one conceived and forced upon us by the political element? Let us therefore give wholehearted support to those voices who cry a new plan which will save us from returning to find a patched-up medical machine, or ourselves the tools of the politicians. Surely now is the time for the promulgation of such a scheme as Dr. Brown has put forward, even if it is not brought into practice until the war is over.

No one can foresee what changes will occur, socially or politically, when peace returns; but we may be sure that they will be profound, and the medical world must be ready and able to give a lead to and cooperate with the Government in the education and assistance of a war-damaged public. Let us hope, or rather let us see to it, that those changes will involve the recognition by the Government of the right of every human to adequate warmth, cleanliness and supplies of a balanced diet. Only when these factors are obtained can we carry on the battle of preventive medicine on a sound strategic basis.

The other sciences are advancing continuously; but in the realm of idealistic medicine we have altered our views very little from what they were a hundred years ago. Our methods are better, our technical triumphs have thrilled us, but fundamentally we remain as curers of the sick. I am sure that the majority of medical men worthy of the name realize at the back of their minds that all is not well within our world, that we need a new design for medical living and that we are more than mere technical tinkers and curers of the people's ills. We should be insurers of the race's future and maintainers of the people's health.

There are more thinking men in the profession than were ever in any political party; but it will not be until the profession shakes itself out of its lethargy, and the preoccupation of war and vitiating effects of successful private practice have been overcome, that numerous voices will be raised in support of men like Dr. Brown.

The adoption of Dr. Brown's scheme or of one similar to his will necessitate a sacrifice on our part, as, on the surface, it is against the fundamental psychology of the majority of medical men. The man who decides to become a medical student is primarily an individualist. He sees in medicine an honoured profession in which he owes allegiance to an ideal but to no other master, which he can practise anywhere and in which he may indulge his own pet methods of treatment without let or hindrance. It can be seen how much sacrifice a disciplined scheme of medical service will entail to these individualists. Working for a salary paid by the State will be one of those sacrifices; but surely the freedom from the monetary ties to our patients will please our æstheticism. A great many medical men by enrolling in the fighting services have given up their individuality, to become part of a disciplined organization and to work without gain. Will not these men, on their return, be amenable to a scheme of social medical service?

Not enough of us carry the ideals with which we entered the profession along with us as we grow older; we are apt to allow them to be submerged in furtherance of more material considerations. Let us now, while the world is in flux, organize ourselves so that we can give full attention to the responsibility which we owe to the public and which is a part of our self-appointed burden in this life. We can fulfil this responsibility to our nation only with state help. Just as all members of the community are obliged to pay their taxes, so it should be obligatory for them to present themselves and their children for medical examination at regular intervals. Before preventive medicine can work efficiently the population will have to submit to some form of compulsion.

The next of our responsibilities is to safeguard the race's future. With war taking gradual toll of the best of our potential male parents, with unhappiness and anxiety rampant among the people at home, a sure deterioration of the nation's general standard of health is to be expected. Is not today the day for the introduction of a plan of eugenics, and of a widespread and intensive education of the public on the principles and purposes of the science? Every insurance company demands a medical examination of its policy-holders, so surely we would be right in demanding the same prior to marriage of the nation's policy-holders. If we could follow this up with suitable advice and education in the light of each individual case, we would be travelling some distance toward our goal of racial improvement. Organized exercise, too, should have its place in the new plan. The accentuation of the thrill of living can be observed by anyone who witnesses the Australian Imperial Force or other bodies of men and women in which exercise is a routine.

Let us then call a halt to our easy-going ways of medical service and let us realize that it is, as Dr. Brown states, a matter of State concern, and needs State assistance for its proper functioning. If we are to serve the public in a more idealistic and less circumscribed way, we must give full support to the plan Dr. Brown has advanced and we must prepare ourselves to accept the diminution of our material interests, lest a scheme not of our own conceiving is forced upon us.

Yours, etc.,

ANTHONY JAMES,
Surgeon Lieutenant,
Royal Australian Naval Reserve.

April 20, 1941.

SIR: I have just read Dr. Robb's book which you reviewed editorially during February, and the article by Dr. Brown, of Colac, on the freedom of the medical profession, as well as the correspondence which followed its publication, with profound gratification that our profession is producing individuals who can see something beyond the narrow limitations of our traditional preoccupation with therapeutics.

In the face of the urgency of the present world position of the nations composing the union of British-speaking peoples and their unenviable common denumerator, of birth rates below maintenance level, the time is surely ripe for us to produce something more than a pious lip-service of the only agency within our reach as doctors which could conceivably affect our national fecundity, namely, the application of prophylactic knowledge for the building of health in every potential parent.

Can we not see that we are free, as Dr. Brown understands freedom, to relinquish our time-honoured policy of *laissez-faire* and initiate a new strategy of professional life? Can we not see that it would pay us in £ s. d. to refuse any longer to supply our second best service to the public; for with a preventive service we should have to perform our functions upon the whole nation and not merely upon those unfortunate enough to fall ill?

Dr. Robb's dream of a guild of healers (page 128 *et sequentes*) is by no means fantastic, and in its membership and fellowship we should surrender no more of our freedom to serve our fellow men than we do when we obey as good citizens of a democratic State such laws as are framed for the greatest good of our fellow men and our own therefore.

We need not wait. We must not wait the dawn of some fancied future day when it will be easier.

There has been tabled in our Western Australian Branch, and, I suppose, in every Branch of the British Medical Association all over the world, an instrument capable, with certain modifications, of beginning this revolution of our professional strategy. This scheme is ours to modify, ours to adopt, or ours to deal with like most ignorant members of democratic bodies do—leave it to somebody else to think about.

But we are members of a craft sworn and habituated to sacrifice our freedom for the relief of suffering. In that sacrifice we achieve, as Dr. Brown shows, an enlargement of our spirit and an enhancement of our power to serve our day and generation.

It must have come to our notice, however, that our fellow men as a rule see to it that such sacrifices as we make shall not go unrewarded, and while we give them personal service which cannot be measured in cash, they respond in those material matters which are necessary to our common life.

They will not be less concerned to do so when they come to realize that the revolutions of method and of payment we demand are designed to end for us our economic dependence upon disease, our vested interest in their illnesses, and as well to forge a new security for the generation even now maturing, although as yet still residing in their bodies.

It is little more than our mental indolence we are asked to surrender.

Repeatedly I have been laughed at because I did not mention money when I advocated reforms; so I will reiterate my belief that our work and our pay would both be increased. Our work, in regularity and effectiveness, and our reward in hard cash.

Yours, etc.,

STANLEY BOYD.

Gnowangerup,
Western Australia,
April 28, 1941.

SIR: "Amongst the far-reaching social reconstructions that will inevitably occur after this war the medical profession must expect to take its share."

I have seen and heard the above or variations of it so often that it now arouses little else but faint derision in my mind. I suggest that for the sake of brevity it might be replaced by some simple symbol, such as *X*.

It sems to be imagined that the millennium is only one stride ahead of Allied victory. Does Dr. Brown, of Colac, share such a belief? I am tempted to think so, because he offers us a scheme for the complete reconstruction of the medical profession from within, which is to anticipate, and possibly prevent, interference with our present structure by the Federal Government in the shape of national insurance or nationalization. As Sir Frederick Stewart has repeatedly assured us that national insurance for Australia is certainly to be reintroduced at an early date, there appears to be a necessity for considerable speed in the introduction of any scheme of voluntary reorganization of medical services for this country, if it is to anticipate and nullify a Government move in the direction Sir Frederick Stewart indicates.

Dr. Brown's scheme might well be considered the final apotheosis of nationalization of medical services, whether introduced by the Government or the profession itself.

Prerequisites for its success would seem to be that national mental condition where each is for his country and none is for himself—the coincident and parallel evolution of all other phases of national life, social, financial and industrial. The complete self-abnegation of all those medical practitioners now depending on their professional efforts for their livelihood.

I should like to hear how the gulf between the present medical services and Dr. Brown's scheme is to be bridged, and how long it would be likely to take.

I fancy one could safely offer considerably more than a shade of odds that both Dr. Brown and myself will have been gathered to our fathers, if not returned to primæval dust, before his scheme comes to fruition, unless the gap is bridged by some form of compulsion applied both to the medical profession and the public, by the only bodies capable of exerting compulsion, that is, by the State or the Federal Government.

I take some consolation from that thought, because, as may be becoming apparent, I neither like nor trust this scheme from Colac.

I have no wish to be labelled reactionary or obstructive, but I do think I can discern some poor quality clay in the feet of this Utopian idol. I do not believe that put into practice, before men and women have undergone considerable mental evolution, it would prove a panacea for all the defects of our medical services. Its very efficiency might prove somewhat soulless. Its control might turn the usual cold and discouraging bureaucratic eye on individualism and progressive reform. Its progress might even be marred by shrewd and underground self-interest by a proportion of its personnel. However, be that as it may, in view of the fact that national insurance is definitely the most imminent threat to the profession, would it not be well to push on as quickly as possible with a comprehensive and detailed scheme for a general medical service for Australia, as the Federal Council is now attempting to do, for use as a yardstick by which to measure any Government scheme of national insurance? By so doing we shall be able to present a united front and say definitely and quickly just what we are prepared and what we are not prepared to accept.

It is my opinion that we should be cautious not to let any red herring, however enticing, distract us from following swiftly and intently upon this trail.

A practical realism for the present and the immediate future seems to me a vital necessity. Nor will it debar the philosophers and thinkers of the profession from planning for a future perhaps a little more remote. Such a planning will not fail to find attention and appreciation if they keep one eye on the near as well as one on the distant horizon, and modify their plans accordingly.

Yours, etc.,

98, Payneham Road,
St. Peters,
South Australia.
April 30, 1941.

JOHN VERCO.

A CASE OF TUBERCULOSIS AND CANCER.

SIR: The report, by Dr. Guy Griffiths, of a patient suffering from pulmonary tuberculosis developing cancer of other organs (*vide* THE MEDICAL JOURNAL OF AUSTRALIA, April 19, 1941) is of peculiar interest. Every medical man who has studied personal and family medical histories of his patients must have considered the possibility of the existence of a common basis for most of the maladies afflicting mankind.

For example, a patient now complaining of severe rheumatoid arthritis will give a history of asthma in the past which disappeared, or was cited as a cure. An existing coronary sclerosis was preceded by a history of *diabetes mellitus* which was cured. Most diseases, in my opinion, are of an allergic nature, and the explanation of a complete change in symptoms and signs, so that the disease is classified totally differently, only stresses the fact that allergy is a condition involving the cell metabolism generally. The site and specific nature of the cells affected alone determine the type of allergy exhibited.

Each cell is an active chemical laboratory in which compounds are synthesized and broken down; oxidations and reductions occur with rapidity and precision. With every chemical reaction fluorescent energy is produced. In the completely healthy cell this fluorescent energy is beneficent and all the cells of every organ and tissue pour out energy which activates neighbouring and even distant cells. Thus, for instance, the carbohydrates ingested are broken down—polysaccharides are hydrolysed to monosaccharides, monosaccharides are utilized as hexose sugars. For anaerobic muscle breakdown phosphorus is added as phosphate, the hexose mono- or diphosphate splitting to two triose (3 carbon chain) phosphates. This change liberates energy. Hence the breakdown runs through phosphopyruvic to pyruvic acid. Of the pyruvic acid a proportion is reconverted to hexose by the energy liberated by further pyruvic acid hydrolysis. The breakdown is to acetaldehyde and is carried out by an enzyme, carboxylase, for the action of which a coenzyme is necessary. This coenzyme is a pyrophosphate ester of vitamin B_1. Desmolysis (breaking of the carbon chain) involves the action of an enzyme. There are many of these dehydrogenases.

Should these chemical reactions not proceed to completion intermediate metabolites accumulate to toxic proportions and the sensitizing action of this fluorescent substance adsorbed into the colloidal surfaces of the various functional mechanisms of the cells results in allergy. Allergy is the excessive activity of any cell function, such as secretion, contraction or cell division, not under the control of normal physiology.

The longer the invading material is present, the deeper it adsorbs and so the task of removing it is the harder. Its very presence facilitates the entrance of similar molecules and the impression made may be so permanent that it is handed down through the germ plasma to the offspring. So in all allergies successive generations in affected families show an earlier incidence and a more and more malignant type. Also a person or family subject to one form of allergy is also subject to other forms, and in due time to hyperactivity, physiologically uncontrolled, of the most fundamental primitive cell structure—the cell reproductive mechanism—as displayed in psoriasis and cancer.

Herein, then, we find the complete answer to the inquiry underlying Dr. Griffiths's case report.

The allergy period preceding the onset of the worst form of the trouble may express itself as neuritis, arthritis, psoriasis, asthma, obliterative endarteritis (for example, Buerger's disease), allergies of the contractile mechanism, for example, coronary occlusion; as allergies of the secretory mechanism; as allergies of the central nervous system, for example various dementias, epilepsy *et cetera*; *paralysis agitans*; acute infective neuritis (shingles), and so on; or finally as a marked loss of resistance to infection, especially to tuberculosis.

Hence I am convinced the treatment of symptoms (conveniently labelled as individual diseases) is wrong, in being futile, and the only hope for a really healthy population to beget a race worthy of the brave new world we fondly anticipate, is to root out, in each patient, and in each family, the malign trunk of the tree, the branches of which are the imposing array of classfied diseases in our medical text-books.

Yours, etc.,

Macquarie Chambers,
183, Macquarie Street,
Sydney.
April 24, 1941.

A. J. FITZGERALD.

BRITISH MEDICAL ASSOCIATION ASSISTANCE TO MEMBERS ON MILITARY SERVICE, BRISBANE.

SIR: *Re* British Medical Association scheme for assistance to members on military service, Brisbane, may I comment on the Chairman's letter in the journal of April 26 last?

Undoubtedly there is much dissatisfaction with the scheme as it now exists; this dissatisfaction in fact was the reason for some members of the British Medical Association refraining from becoming contributors.

Dr. Alex. Marks refers to the difficulties to be faced by members on their return to civil life. At the meeting last November to which he refers I stressed this point and indicated how the scheme could and should be amended in order to make this provision more effective and at the same time to give more present assistance where it is required. These are essential features of the scheme, and amendment of the scheme is urgently required. In its present form it does not recognize the gravity of the war situation.

I would like to draw the Trustees' attention to the clause in the agreement which gives them power of calling a meeting where such matters could be discussed.

Yours, etc.,

Ballow Chambers,
Wickham Terrace,
Brisbane.
April 28, 1941.

ERNEST CULPIN.

SOME MEDICAL ASPECTS OF CRIME.

SIR: Although this discussion has been, like King Charles II, "a most unconscionable time dying", there are a few points in Dr. McDonald's letter in the journal of April 19 which call for an answer to his rejoinder to my reply to his criticism of my article. With most of his letter I quite agree; here are the points of disagreement:

(1) In discussing the credibility of witnesses I did not include Chicherin because I know nothing of him; all I could find out was that a Georg Chicherin was Commissar for Foreign Affairs from 1918 to 1930, and I do not know if he was the writer of "I Speak for the Silent".

(2) Dr. McDonald states: "I took my evidence from Lyons . . . Duranty, Moggeridge and Littlepage. These may, I think, be considered as carrying a great deal more weight than the Dean of Canterbury in that they spent much time in Russia, spoke Russian, and were brought into the closest relation with Russians of all classes." The last sentence seems to me to be disingenuous in that his criteria fit the Dean of Canterbury very well, whereas his suggestion is that the Dean had none of these advantages. He was a scientist and engineer before he was a churchman, and knew enough of economics to write for *The Economist*. Let us turn to Lyons, whom Dr. McDonald places first in his list of witnesses—an emotional journalist writing for a bitterly anti-Soviet Press, and also a self-confessed liar of a very revolting type in that his lie was told for his own advantage and damaged a confrère's reputation. He tells the disgusting story on page 575 of "Assignment in Utopia". I should have expected such a recital to have made any intelligent reader dubious about the rest of Lyons's sensational disclosures.

(3) Dr. McDonald accuses me of introducing an argument "not germane to the subject". If he had said "which seems to me not germane to the subject" I would have accepted it, but as several intelligent people agree with me that it is germane, obviously it is a matter of opinion.

(4) I do not see that Dr. McDonald has any justification for charging me with having "gone back to the mediæval conception of infallibility". After reading fairly widely, with a genuine wish to come as near the truth as possible, I had to believe that a group of writers represented by the Webbs, Laski, Sigerist and the Dean were, in general, giving a true picture, while another group, represented by Trotsky, Souvaraine and Krevitski (to whom I may add Lyons) were unreliable. But I know very well that we can never get near enough to the truth for any opinion to be final.

Yours, etc.,

Katoomba,
New South Wales,
April 28, 1941.

E. P. DARK.

SIR: Obviously the sight of Dr. Paul Dane being psychoanalysed was too much for the delicate sensibilities of Dr. Michael Kelly, who, with pudic rapidity, rushed into print (April 26, 1941), not to defend Dr. Dane, but to upbraid me, the perpetrator of this public outrage. His reaction to my letter supplies a neat yet unexpected proof of its contentions. My suggestion that crime had a subconscious motivation and that the criminal might be more effectively treated by psychotherapy than by punishment seemed to Dr. Kelly to constitute an offence; and as the punishment of offenders "has been sanctioned by all laws, human and divine", Dr. Kelly felt it his duty to punish me. And he chose not the lash, but the pillory, ridicule being the more subtle disguise for his vengeance.

Now, when a person is incensed and sets out to wreak his vengeance upon an offender he frequently overdoes the punishment. He overplays his part in his anxiety to effect his unconscious purpose. Consequently Dr. Kelly, not content with his risible reference to nursery rhymes, charges me with making the ridiculous assertion that "psychoanalysis will cure all criminals". The subconscious motive behind this glaring misstatement is all too obvious. Vengeance lets down its mask. Anyone with the slightest acquaintance with psychoanalysis knows that many people are unsuitable for analysis; and anyone with any insight into the criminal mind should know that a percentage of criminals is mentally defective and many are environmental misfits and psychopaths for whom psychoanalysis has nothing to offer. Incidentally, Sir, since the subject forms one of Dr. Kelly's gibes, Adolf Hitler would not now be the virtual dictator of Europe had he been psychoanalysed in his early manhood.

In a final burst of sarcasm, ridicule having run dry, Dr. Kelly suggests that the subconscious shall be our totem. Would that it were! For we would then possess greater understanding of the behaviour of our fellows. But, alas, in criminal matters our totem is still the truncheon. Dr. Kelly knows this and accepts it gladly; and all those people who prate about punishment and its merits, and who uphold the established order and pledge their security in the police force, know that the truncheon is our totem. They would not have it otherwise. It is such a nice tangible totem. It stands so plainly and valiantly for law and order, albeit for bloodshed and concentration camps.

In his noctambulation to the nursery Dr. Kelly appears to have met only Jack and Jill and Humpty-Dumpty, whose exploits he deplores. It is a pity he did not see that somewhat stolid and self-satisfied exponent of the *status quo* called Jack Horner, who, scorning the exhilaration of mountaineering delights, sits contentedly in a fusty corner, munching the soggy pie-crust of convention and pulling out his prosaic and platitudinous plums to the complacent refrain of "See what a good boy am I".

Psychoanalysis is infinitely revealing.

Yours, etc.,

33, Collins Street,
Melbourne,
May 6, 1941.

REG. S. ELLERY.

MEDICAL VOLUNTEERS.

SIR: Your leading article of May 3, 1941, indicates what anyone who served in the last war knows full well. There is only one solution to the shortage not only of doctors, but of people in many occupations.

We all agreed at the end of 1918 that in a total war everyone should be conscripted, even some children. Some would be told to continue their civil activities and other allotted to special jobs. But this requires virtually a commander-in-chief with a staff who can deal with the problem without hesitation. It may be of interest to state that in the Great War 27% of the entire male population of Great Britain were conscripted, 19% in New Zealand, whilst Australia and Canada under the voluntary system contributed 13%.

Yours, etc.,

103-105, Collins Street,
Melbourne,
May 5, 1941.

JAMES W. BARRETT.

A THERAPEUTIC PROBLEM.

SIR: The following brief notes may be of interest to some of your readers, from a pharmacological standpoint.

Miss H.M., aged 65, first came under treatment for a spontaneous dislocation of the right shoulder joint. A brief examination prior to general anæsthesia showed her blood pressure to be 250/130, and that she had a paresis of the N III cranial, with a small eccentric, oval-shaped pupil, which did not react to light. There was, in addition, a paresis of the lower half of the right side of the face, and the tongue deviated to the right on protrusion, otherwise appearing normal macroscopically. Her chief complaint, however, was an incessant salivation, with a bad taste in the mouth. This had troubled her continuously for two years, treatment being unavailing, and she was unable to speak a few words without the necessity of removing excess of frothy saliva from her mouth with a handkerchief.

The motor and sensory somatic nervous systems generally appeared unimpaired, and although the spontaneous dislocation of the shoulder joint suggested the possibility of some wasting of the right trapezius and sterno-mastoid muscles, there was no evidence of gross paralysis in them, such as would follow N XI paresis.

The N XII was obviously affected, as shown by the deviation of the tongue to the right, due to the unopposed action of the left genioglossus.

She was unable to define the time of onset of these paralyses, and it seemed reasonable to conclude that she had at some time or other suffered an acute lesion, probably a thrombosis, in the region of certain nuclei in the lower part of the *pons varolii* and the upper part of the *medulla oblongata* on the right side, namely, the N VII, which sends secretory fibres by way of the *chorda tympani* nerve to the submandibular and submaxillary glands; the N IX, which sends secretory fibres to the parotid gland by way of its tympanic branch; and the N X, per medium of its *nervus ambiguus* connexions. The escape of N XI would be explained by its extramedullary situation in the spinal cord. The N XII was within the area of damage.

The intense salivation and subjective sensations of altered taste were explicable along these lines, as a lack of inhibition of the secreto-motor reflexes on the one hand and a paresis of certain fibres of sensation, probably those of the anterior two-thirds of the tongue including sweet taste, on the other.

The problem, however, was to give her relief from the distressing salivation. At first a simple mixture containing

tincture of belladonna, ten minims to the half ounce, was tried and was ineffective. Then it was supplemented with pills containing zinc oxide grains iii and *Extractum Belladonnæ Siccum* grain ¼, *ter in die*, on the grounds that they are effective in the night sweats of chronic toxæmia, for example, in pulmonary tuberculosis. These proved ineffective also.

Finally, somewhat empirically, I gave her a mixture containing *Tinctura Stramonii* 20 minims to the half ounce, fourth-hourly, the drug having some reputation, usually decried, however, in lesions of the basal ganglia, such as those following encephalitis of the mid-brain. I was both pleased and surprised to find that within three days of this treatment the salivation had almost entirely ceased except for a little in the early mornings, and has remained so for a considerable time now.

The bad taste was combated with saccharin tablets, one *ter in die*.

I might mention that there was no visible lesion in the salivary glands.

Yours, etc.,

B. JOHNSON, M.B., B.S. (Sydney).

195, Macquarie Street,
Sydney,
April 5, 1941.

THE MEDICAL WAR RELIEF FUND.

THE following is a third list of contributions to the Medical War Relief Fund established by the Federal Council of the British Medical Association in Australia for the relief of distressed medical practitioners in Great Britain.

South Australia.

£25: Dr. D. Parkhouse, Dr. H. W. Wunderly.

£20: Dr. M. Mocatta.

£10 10s.: Dr. J. A. Bonnin, Sir Henry Newland, Dr. J. G. Sweeney, Dr. T. G. Wilson, Dr. D. R. Wallman, Dr. G. R. West.

£5 5s.: Dr. G. H. Burnell, Dr. J. S. Covernton, Dr. H. E. Dunstone, Dr. W. Gilfillan, Dr. F. W. Hoopmann, Dr. E. A. Matison, Dr. H. Mayo, Dr. B. Smeaton, Dr. A. F. Stokes, Dr. W. C. T. Upton, Dr. J. R. L. Willis, Dr. F. L. Wall.

£5: Dr. L. D. Cowling, Dr. T. G. Fleming, Dr. H. Gilbert, Dr. F. S. Hone, Dr. R. H. Hamilton, Dr. W. G. Heaslip, Dr. G. W. Smith, Dr. E. B. Thomas, Dr. C. Yeatman.

£3 3s.: Dr. J. W. Close, Dr. C. Finlayson, Dr. L. Opit, Dr. J. Riddell, Dr. P. F. Stratmann, Dr. N. M. Wigg, Dr. L. A. Wilson.

£3: Dr. E. Arnold.

£2 2s.: Dr. E. Brown, Dr. E. Bishopverder, Dr. A. W. Campbell, Dr. R. L. T. Grant, Dr. R. A. Goode, Dr. H. R. R. Hancock, Dr. A. Britten Jones, Dr. E. McLaughlin, Dr. F. St. J. Poole, Dr. J. W. Rollison.

£1 10s.: Dr. A. R. Clayton, Dr. A. T. Harbison.

£1 1s.: Dr. H. B. James, Dr. W. W. Jolly, Dr. H. R. Letcher, Dr. W. A. Verco.

10s. 6d.: Dr. M. C. Newland.

Western Australia.

£10 10s.: Dr. H. S. Lucraft.

£5 5s.: Dr. F. W. Carter, Dr. L. A. Hayward, Dr. B. A. Hunt, Dr. H. Stewart.

£3 3s.: Dr. H. M. Hill.

£2 2s.: Dr. A. Murphy.

£1 1s.: Dr. C. Caldera, Dr. N. Joel, Dr. H. Rockett, and Dr. H. G. D. Breidahl and Dr. D. Wilson (weekly contribution).

Notice.

THE Medical Secretary of the New South Wales Branch of the British Medical Association writes that His Grace the Anglican Archbishop of Sydney has arranged to hold a special service for the medical profession at Saint Andrew's Cathedral, Sydney, on Sunday, June 1, 1941, at 7.15 o'clock p.m. Special reference will be made to members of the medical profession serving with the defence forces and to those who have lost their lives on active service.

Obituary.

WILLIAM BRENDON CURGENVEN.

WE regret to announce the death of Dr. William Brendon Curgenven, which occurred on May 11, 1941, at Waverley, New South Wales.

Diary for the Month.

MAY 19.—Victorian Branch, B.M.A.: Hospital Subcommittee.
MAY 20.—New South Wales Branch, B.M.A.: Ethics Committee.
MAY 20.—Victorian Branch, B.M.A.: Organization Subcommittee.
MAY 20.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
MAY 21.—Western Australian Branch, B.M.A.: Branch.
MAY 22.—New South Wales Branch, B.M.A.: Clinical.
MAY 22.—Victorian Branch, B.M.A.: Executive.
MAY 23.—Queensland Branch, B.M.A.: Council.
MAY 27.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MAY 28.—Victorian Branch, B.M.A.: Council.
MAY 29.—New South Wales Branch, B.M.A.: Branch.
MAY 29.—South Australian Branch, B.M.A.: Branch.
MAY 30.—Queensland Branch, B.M.A.: Commencement of Post-Graduate Course.
MAY 30.—Tasmanian Branch, B.M.A.: Council.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Proserpine District Hospital; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to the Editor, THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such a notification is received within one month.

SUBSCRIPTION RATES.—Medical students and others not receiving THE MEDICAL JOURNAL OF AUSTRALIA in virtue of membership of the Branches of the British Medical Association in the Commonwealth can become subscribers to the journal by applying to the Manager or through the usual agents and booksellers. Subscriptions can commence at the beginning of any quarter and are renewable on December 31. The rates are £2 for Australia and £2 5s. abroad *per annum* payable in advance.